

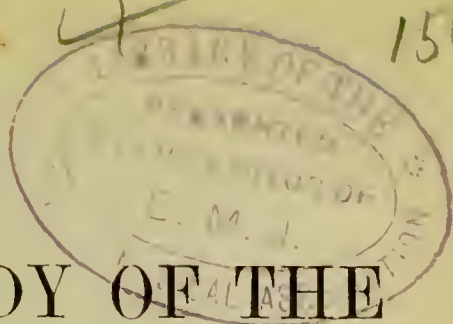
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GUIDE TO THE STUDY OF THE
SPECIMENS IN THE SECTIONS
OF OBSTETRICS AND
GYNÆCOLOGY

IN THE

MUSEUM OF ST. BARTHOLOMEW'S
HOSPITAL

BY

HERBERT WILLIAMSON, M.A., M.B., M.R.C.P.

ASSISTANT PHYSICIAN ACCOUCHEUR

AND

REGINALD JAMISON, M.A., M.B., F.R.C.S.

JUNIOR DEMONSTRATOR OF PATHOLOGY

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PART I.

I.

NORMAL PREGNANCY.

PREGNANCY commences with the fusion of the ovum and spermatozoon. Under normal conditions this event probably occurs in the Fallopian tube.

THE SEGMENTATION OF THE OVUM.

As the result of fertilisation the ovum divides into a mass of cells; the term "segmentation" is applied to the process of division. From this mass of cells develop the foetus or embryo, the amnion, chorion, and placenta. Up to the time of delivery these structures are referred to collectively as the "ovum." Soon after fertilisation the ovum travels down the Fallopian tube until it reaches the cavity of the uterus.

FORMATION OF THE DECIDUA.

As soon as pregnancy commences changes take place in the uterine mucous membrane, which from

this time is known as the "decidua." The decidua may therefore be defined as the mucous membrane of the uterus during pregnancy. The changes observed in it are :—

(1) It becomes more vascular and thicker, attaining by the end of the second month of pregnancy a thickness of $\frac{3}{16}$ inches (cf. Sp. 1207A and 1208A).

(2) The glands are elongated and dilated. The dilatation is greatest in the middle third. The mouths are but little dilated and the deepest portion of the gland not at all.

(3) The cells of the inter-glandular connective-tissue stroma of the mucosa become larger and assume a rounded or oval form. They are then known as "decidual cells." As a result of these changes three layers may be distinguished in the mucous membrane.

(a) A superficial layer consisting chiefly of decidual cells in which the glands are but little dilated—the *stratum compactum*.

(β) A middle layer composed chiefly of dilated glands and containing relatively few decidual cells—the *stratum spongiosum*.

(γ) A deep layer in which the structure of the mucosa has undergone but little modification—the *unchanged layer*.

When, during labour, the membranes separate from the uterine wall, detachment occurs through the deeper layers of the stratum spongiosum. The stratum compactum and the greater part of the stratum spongiosum adhere to the chorion and are expelled from the uterus with that membrane. The un-

changed layer remains attached to the uterine wall, and from it the endometrium is regenerated.

SP. 1211.—*Shows a Fœtus of the third month of Gestation enveloped in its Membranes.*

The decidua has been partially separated from the ovum and turned back. It is a fleshy membrane one eighth of an inch thick. On the inner surface (*i.e.* the one in contact with the ovum before the membrane was stripped back) are numerous pits, the mouths of the dilated uterine glands. The outer surface is shaggy; this shaggy portion is the stratum spongiosum through which separation from the uterine wall has taken place.

THE IMBEDDING OF THE OVUM.

By the time the ovum reaches the cavity of the uterus it possesses a covering of cells known as the "trophoblast." The trophoblast has the power of eroding and destroying the maternal tissues with which it comes in contact. The ovum is thus enabled to bore its way into the decidua, in the depth of which it grows and develops. The small canal through which it bored its way is closed by blood-clot and the ovum is then completely surrounded by decidua. As the ovum grows it projects towards the cavity of the uterus, pushing in front of it a covering of decidua.

We distinguish three separate portions of decidua:—

(1) The "decidua serotina" or "decidua basalis,"

the portion which lies between the ovum and the uterine muscle wall.

(2) The “decidua reflexa” or “decidua capsularis,” the portion which covers the projecting part of the ovum.

(3) The “decidua vera,” the portion lining the remainder of the uterine wall but at first not in direct contact with the ovum.

As the ovum gradually becomes larger the decidua reflexa approaches the decidua vera and finally fuses with it. The cavity of the uterus is then entirely filled by the ovum. This event usually occurs at the fourteenth week.

SP. 1208A.—*A Pregnant Uterus at the end of the twelfth week of Gestation.*

Note that the three portions of the decidua can be clearly distinguished. The reflexa (labelled R) is separated from the decidua vera (labelled V) by a small cavity only. Had the pregnancy continued fusion of the two would have occurred and the ovum would then occupy the whole of the uterine cavity. Note further the thickness of the decidua. The stratum spongiosum can be distinguished by the naked eye.

CHANGES IN THE SHAPE AND FORM OF THE UTERUS DURING PREGNANCY.

The adult virgin uterus weighs approximately 1 oz.

At the end of pregnancy the weight of the uterus, exclusive of its contents, is 2 lb.

The measurements of the virgin uterus are: Length, 3 inches; breadth, $1\frac{3}{4}$ inches; depth, $1\frac{1}{4}$ inches.

At the end of pregnancy the length is $15\frac{1}{2}$ inches; breadth, $10\frac{1}{2}$ inches; depth, $9\frac{1}{2}$ inches.

The virgin uterus possesses a potential, but under normal conditions no actual cavity, for its anterior and posterior walls are in contact. The uterus at full term possesses a cavity capable of holding 10 pints of fluid (*cf.* Sp. 2943B, 3095c, and 1229).

The increase in size is due in part to hypertrophy of the uterine walls and in part to dilatation of the cavity by the growing ovum.

In the earlier stages the uterine walls are markedly thickened (*cf.* Sp. 1208A: *A uterus at the end of the third month of gestation*). The maximum thickness ($\frac{1.0}{16}$ inches) is attained by the end of the fourth month (*cf.* Sp. 1221).

From this time onwards the ovum grows rapidly and stretches the walls, which at full term measure only $\frac{3}{16}$ inch in thickness. In spite of this thinning the weight of the uterine muscle continues to increase.

SP. 1227.—*A Uterus at the seventh month of Gestation.*

SP. 1229.—*A Uterus at full term.*

All the tissues of the uterus share in this hypertrophy, but the muscular tissue to a greater extent than the others. The individual muscle-fibres are increased in size and new fibres develop.

After the muscle the most striking changes are observed in the arteries. They increase in size and become tortuous. They may be felt during life, pulsating through the vaginal fornices.

SP. 1231.—*A Dried Specimen of a Uterus in which the Vessels have been Injected.*

The anastomosis at the side of the organ between the ovarian and uterine vessels is well shown, and to a less extent the anastomosis between the vessels on opposite sides on the front and back of the organ.

CHANGES IN SHAPE.

During the first weeks of pregnancy the ovum occupies only the upper portion of the uterine cavity. The chief increase in size occurs in the antero-posterior diameter of the upper portion of the uterus. This becomes globular in shape, whilst the lower portion remains flattened.

By the end of the third month the ovum occupies nearly the whole cavity. The globular form is lost, and the uterus once again becomes pyriform.

SP. 1208A.—*A Uterus at the end of the twelfth week of Gestation.*

The organ is pyriform, but the process of hardening has produced some distortion and flattening. This specimen illustrates the fact that the cervix undergoes no increase in length during pregnancy.

During the fourth and fifth months the chief increase occurs in the transverse diameter of the

uterus, so that it assumes the form of a flattened sphere.

SP. 1221.—*A Uterus between the fourth and fifth month of Gestation.*

By the end of the sixth month the pyriform shape is regained and maintained to the end of pregnancy.

SP. 1224.—*Sixth month.*

SP. 1226.—*Seventh month.*

SP. 1229.—*Full term.*

DEVELOPMENT OF THE OVUM.

FORMATION OF THE CHORION.

The earliest known human ovum is that of Peters. It was obtained immediately after death from the body of a woman who committed suicide three days after missing her menstrual period. At this time the chorion is already well developed, and from its outer surface project many chorionic villi. It consists of an outer covering of cells derived from the ectoderm and known as the trophoblast, and an inner layer of mesoblastic tissue.

The chorion surrounds a central cavity, in which the embryo lies. The embryo is attached to the inner surface of the chorion by a stalk of mesoblastic tissue known as the body-stalk. The embryo is a minute object in comparison with the chorionic cavity in

which it lies. It consists of three layers of cells—epiblast, mesoblast, and hypoblast. From these three layers all the organs of the body are derived.

The epiblast, in addition to taking a share in the formation of the body of the embryo, also forms the second foetal membrane—the amnion. The process of development of the amnion is comparable to the formation of a blister. Cleavage occurs between the superficial and deep parts of the epiblast. Into the space so formed fluid is poured out—the liquor amnii. The cleavage commences on the dorsal surface and continues over the sides and caudal and cephalic extremities until eventually the amnion is in contact with the embryo only at the body-stalk.

The amnion grows at this stage more rapidly than the chorion, and the liquor amnii increases in amount whilst the fluid of the chorionic cavity decreases, so that eventually the chorionic cavity is obliterated and the amnion becomes adherent to the inner surface of the chorion. From the time this junction is effected the amnion and chorion grow at equal rates, and their relative positions remain unchanged throughout pregnancy.

Ovum of the second and third week.

The earliest ova in our museum are probably of from two to three weeks' development. If specimen 1196A be held to the light the ovum is seen to be bounded by a translucent membrane from which project numerous shaggy processes. This membrane is the chorion; the projecting processes are chorionic villi. Note that at this stage of development the villi

grow from every part of the outer surface of the chorion. In the centre of the specimen is a small opaque body attached by a stalk to the outer envelope. This is the embryo. On looking closely the embryo is seen to be enclosed in a delicate inner membrane, the amnion. The amnion has a diameter only one fifth as great as that of the chorion. The process joining the embryo to the chorion is the body-stalk, which develops later into the umbilical cord. These structures can be clearly seen by the aid of a pocket lens.

Specimens Nos. 1190, 1201A and 1196B are ova in a similar stage of development.

VASCULARISATION OF THE CHORION.

During the early weeks of development the embryo is nourished by a rudimentary system of blood-vessels in connection with the yolk-sac. This is the vitelline circulation. It attains its maximum development during the fourth week and then atrophies as the permanent circulation is established. The establishment of the permanent vascular system is marked by the appearance of two vessels lying side by side in the long axis of the mesoderm of the embryo. They appear as early as the second week, and from them the heart and blood-vessels develop. From the future abdominal aorta two arteries with their corresponding veins grow down the body-stalk of the embryo, reach the chorion and send their terminal radicals into the chorionic villi. Simultaneously the chorionic villi increase in size and in the number of their branches.

The villi in the situation of the decidua basalis (decidua serotina) penetrate the maternal tissues and bore their way into maternal blood-vessels, so that some lie free in spaces filled with maternal blood while others remain attached to the maternal tissues. The villi in contact with the decidua capsularis (decidua reflexa) atrophy, whilst those over the basalis grow rapidly and branch repeatedly, so that an ovum of the sixth week shows a marked difference between the size and number of villi on its attached side, where the chorion is thickly covered, and on its free side, where the chorion is smooth.

The name "chorion frondosum" is given to the part of the chorion where the villi persist, and "chorion læve" to the part from which they atrophy. The placenta develops from the chorion frondosum. The differentiation into a chorion frondosum and a chorion læve commences about the fifth or sixth week, and the villi have atrophied from the chorion læve by the eighth week.

SP. 1202.—*Ovum between four and six weeks old.*

The entire ovum is displayed. It is considerably larger than the last specimen examined, having a diameter of $1\frac{1}{2}$ inches. The distinction between chorion læve and chorion frondosum is manifest.

Ovum at the sixth week.

During the fourth to the sixth week the embryo increases greatly in size, measuring at the end of that period $\frac{3}{4}$ inch. It is much curved on itself, so that the head and tail ends are nearly in contact. The

rudiments of eyes, mouth, and ears are visible; the limbs are formed, but the several fingers and toes have not been differentiated.

Sp. 1198.—*An Ovum of about the same age as the last.*

It has been laid open to show the interior. The amnion has grown until it has become adherent to the inside of the chorion and to the body-stalk throughout its length.

The embryo is three quarters of an inch long. It is much flexed. The eyes and pits for the mouth and ears are distinguishable. The hands and feet are differentiated from the rest of the limbs. Fingers and toes have not appeared, but their position is indicated by a transverse groove.

Note the broad paddle-shape of both hands and feet; this is lost as soon as the fingers and toes are formed.

See also Sp. 1197 and 1201.

Ovum at the eighth week.

Between the sixth and eighth week the embryo attains the length of 1 inch. The head becomes larger from the development of the brain; the limbs, nose, and ears are better formed. The primary centres of ossification appear in most of the bones. The external genitalia are formed, but without sex differentiation.

Sp. 1206.—*Ovum of six to eight weeks.*

Part of the decidua is attached to the chorion frondosum, showing that the villi of the developing

placenta have gained attachment to the maternal tissues. The head of the embryo is broken off and lies in the bottom of the jar. The eyes are clearly seen but are without eyelids. The external auditory meatus, nose, and mouth appear as pits. The centres of ossification of the bones of the cranial vault can be distinguished as they are less transparent than the rest of the vault. The body of the embryo is seen inside the membranes. The fingers and toes are well formed. The umbilical cord is relatively thick and attached to the ventral surface of the embryo near the tail end.

SP. 1209.—*Ovum at tenth week.*

Shows the uterus and contents at the tenth week of gestation. The uterus has been laid open from the front. The cavity is lined by decidua vera in the form of a thick layer attached to the uterine wall. The decidua serotina lies behind the ovum and cannot be seen. The decidua reflexa surrounds the ovum. A cavity still exists between the reflexa and vera.

The embryo has escaped from the membranes, but is still attached to the placenta by the umbilical cord, which is not twisted. The fused amnion and chorion are seen as a smooth transparent membrane. The villi have completely atrophied over the chorion læve. The chorion frondosum (the placenta) is not seen.

By the twelfth week the ovum has increased still further in size and occupies nearly the whole of the uterine cavity.

SP. 1208.—*A Uterus and its Contents at the end of the twelfth week of Gestation.*

The following structures are seen: (1) The placenta, situated on the upper portion of the posterior wall and consisting of a mass of branching chorionic villi. (2) The amnion and the chorion fused together. (3) The decidua vera lines the uterine cavity. (4) The decidua reflexa is closely attached to the outer surface of the chorion læve. The decidua vera and reflexa are still separated by a small space. (5) The embryo now measures $3\frac{3}{4}$ inches in length. It still preserves its general attitude of flexion. The head has increased considerably in size. The eyelids are formed but the eyes are not closed. Nails are seen on the fingers and toes, and the external genitals show distinctions of sex.

SP. 1248A.—*Shows a Fœtus of sixteen weeks' Development.*

The length is 5 inches. The head constitutes one quarter of the entire body. The eyelids are closed, the external genitals show distinct sex characteristics. The finger-nails are well formed.

SP. 1250.—*Represents a Fœtus of twenty-eight weeks' Gestation.*

It differs from the full term fœtus in the following respects :

Twenty-eighth week.	Full term.
Weight : 3 lb.	7 lb.
Length : 14 inches.	18 inches.
Skin : Wrinkled and of a red colour. Covered with fine hair, lanugo.	Smooth from the deposit of subcutaneous fat. Lanugo shed over greater part of the body.
Testes : In the inguinal canal.	In the scrotum.
Nails : Do not reach beyond the end of the fingers.	Reach beyond the end of the fingers.

II.

DISEASES OF THE OVUM.

ABORTION.

The predisposing causes of abortion are many but they will not be discussed here. Abortion may result from (1) death of the ovum, or (2) from detachment of the ovum from the uterine wall. Up to the third month of gestation the ovum is usually expelled entire; after the third month the process resembles labour in that the foetus is expelled first and the placenta and membranes afterwards. After its expulsion the ovum may present varying appearances:

(a) It may be expelled entire, and as far as its naked-eye characters are concerned, unchanged. Part of the decidua habitually adheres to the chorion, and sometimes forms a complete investment for the ovum (*cf.* Sp. 1196A, 1190, 1201A, 1202, 1206).

(b) An ovum of not more than two months' gestation may be discharged in fragments so small that its nature can be recognised by microscopic examination only.

(c) The ovum may be infiltrated with blood and form what is known as an “apoplectic ovum” or “hæmatoma mole.” The hæmatoma moles are subdivided into (1) tuberosc fleshy moles, and (2) carncous moles.

(1) TUBEROSE FLESHY MOLE.

Between the chorion and decidua is a space filled with maternal blood—“the chorio-decidual space.” Into this space both maternal arteries and veins open so that through it maternal blood is constantly circulating. The space is traversed by the chorionic villi, some of which float freely in the maternal blood, whilst others are attached by their distal extremities to processes of decidua. The villi so attached are known as the “fastening villi,” and together with the processes of decidua form septa—“the chorio-decidual septa”—which hold the chorion and decidua together. Under certain conditions, probably as the result of thrombosis in the veins carrying the blood away from the chorio-decidual space, the space becomes over-distended, the circulation ceases and the blood coagulates. The chorion and decidua are held together by the septa, and at the spots where the septa exist no great separation of these membranes is possible, but in the intervals between the septa the blood causes bulging of the amnion and chorion towards the amniotic cavity, and a number of rounded bosses are seen upon the foetal surface limited by the attachments of the septa.

The chorion may rupture and the blood lie between the chorion and the amnion. The amnion is elastic

and is as a rule unruptured but pressed inwards, encroaching upon the amniotic cavity. The embryo is usually found in the sac; it may present a normal appearance, but may form only a shrivelled mass attached to a thickened umbilical cord, or may be indistinguishable. The general appearance of a tuberosc fleshy mole is that of a firm blood-clot covered on the outside by decidua, and having embedded in its centre the smooth-walled amniotic cavity.

SP. 3061A.—*Tuberosc Fleshy Mole.*

A twin abortion. The embryos have each their amnion and chorion but are covered by a common investment of decidua. Both sacs have been laid open. Within each is a foetus of about one month's development. The cord is much thickened. The foetal surface of the amnion is raised into numerous bosses by sub-chorionic hæmorrhages.

SP. 3045.—*An Ovum covered by Decidua.*

The embryo is nearly 2 inches long, and is obscured by a membranous substance as though it had been heavily coated with paint. The cord is shrivelled. The foetal surface of the amnion is raised by two well-marked sub-chorionic hæmorrhages. The cord is attached over one of them (*cf.* 3058C, 3058B, 3046, 3061).

(2) CARNEOUS MOLE.

In the carneous mole the chorio-decidual space is occupied by blood-clot. The chorio-decidual septa have given way, and the bossed appearance seen in

the tuberosc mole is no longer visible, the whole mass consisting of blood-clot covered on the outside with decidua, and having embedded within it chorion, placenta, and the remains of the amniotic cavity. These structures, however, are often indistinguishable.

SP. 3056.—*Carneous Mole*.

An early ovum with its decidua reflexa and part of the vera. The decidua vera is seen at the top; the rest of the specimen consists of the ovum covered by decidua capsularis. The amniotic cavity has been laid open, displaying the embryo. The foetal surface of the amnion is bossed, and almost compresses the foetus. The membranes are infiltrated with blood, and cannot be distinguished by the naked eye.

SP. 3056A.

The specimen consists of an ovum, covered with decidua, expelled after three months' amenorrhœa. In the upper part is seen the chorio-decidual space distended with blood. In the lower part is the ovum compressed by this effusion. The membranes are also infiltrated with blood, the amniotic sac is shrunken and contains no foetus.

INCOMPLETE ABORTION.

The whole of the uterine contents may not be evacuated in the process of the abortion. Such an abortion is called "incomplete" (*cf. Retained placenta*).

MISSED ABORTION.

It sometimes happens in a case of threatened abortion that the symptoms pass off but that the foetus has perished. The foetus may be retained for a long time. This phenomenon is known as missed abortion (*cf. Retention of dead fœtus in utero*).

ANTEPARTUM HÆMORRHAGE.

Hæmorrhage from separation of the placenta occurring between the time at which the foetus becomes viable and its delivery is known as antepartum hæmorrhage.

Antepartum hæmorrhage is classified as—(1) accidental, where the bleeding is due to the separation of a normally situated placenta; (2) inevitable, where the bleeding is due to separation of a placenta prævia.

(1) ACCIDENTAL HÆMORRHAGE is due to premature separation of the normally situated placenta. It is commoner in multiparæ than in primiparæ, and may be associated with trauma, diseases of the decidua or nephritis. Accidental hæmorrhage is known as “concealed” if the blood is retained within the uterine cavity, and “external” if it escapes from the cervix and appears in the vagina.

In concealed accidental hæmorrhage:—

(a) The blood may be poured out behind a placenta whose margin remains attached to the uterine wall. This is known as “retroplacental hæmatocele.”

(b) The effused blood may lie not only behind the placenta but also between the membranes and the uterine wall, and be prevented from escaping by firm adhesions of the membranes around the margins of the internal os.

(c) The blood may burst through the membranes and collect in the amniotic cavity.

(d) The presenting part may fit into the cervix so tightly that the blood is thereby retained in the uterus.

External accidental hæmorrhage results when the blood effused behind the placenta separates the placental margin, strips the membranes downwards until the internal os is reached, and then escapes through the cervical canal.

SP. 3095c.—*Accidental Hæmorrhage.*

Half a uterus at a late period of gestation, showing detachment of the normally situated placenta. The placenta is separated from its attachment to the anterior wall of the uterus by a mass of coagulated blood. The hæmorrhage is limited to the placental site, constituting the variety known as retroplacental hæmatocele.

SP. 3095B.—*Accidental Hæmorrhage.*

The uterus and placenta from a case of accidental hæmorrhage in the eighth month of pregnancy. The front wall of the uterus has been cut away and the cavity exposed. The anterior third of the

placenta is detached from the uterine wall by a mass of blood-clot. The remainder of the placenta is still in its natural position.

(2) INEVITABLE HÆMORRHAGE.

When the placenta is situated over that part of the uterus which dilates to allow the passage of the foetus (the lower uterine segment) it is said to be "prævia." Dilatation cannot occur without separation of the part of the placenta so situated and the detachment causes hæmorrhage.

Two varieties are described :

(a) Placenta prævia centralis where the placenta lies over the os internum.

(b) Placenta prævia lateralis where the placenta does not lie over the os internum, but is situated in part upon the lower uterine segment.

ÆTIOLOGY.—Multiparity and rapid child-bearing predispose to placenta prævia, but the immediate causes of the low situation of the organ are : (1) A low implantation of the ovum ; (2) the formation of the placenta on the decidua reflexa (see Sp. 1208A) ; (3) a combination of these two conditions.

SP. 3093B.—*Placenta Prævia Centralis.*

A sagittal section of a uterus at full term showing a placenta prævia centralis *in situ*. The placenta is attached to the lower half of the anterior wall and the lower fourth of the posterior, stretching completely across the internal os. The cervical canal is partially dilated and some separation of the pla-

centa has occurred. The lowest portion of the placenta is infiltrated with effused blood.

SP. 3094.—*A Placenta and Membranes from a Case of Placenta Prævia Centralis.*

The membranes are intact. In the middle of the placenta is an irregular rent, made for the extraction of the fœtus.

RETENTION OF A DEAD FÆTUS IN UTERO.

Although common in the lower animals it is rare in human beings for a dead fœtus to be retained in utero. When death of the fœtus occurs early in pregnancy the event is termed “missed abortion”; when near full term “missed labour.” In the case of twin pregnancy an exception is found, for if one ovum dies it is usually retained until the survivor is born.

A retained fœtus may undergo :

(1) MACERATION.—This is the common fate of a single dead fœtus. The cuticle becomes loosened, raised in blebs, and here and there detached, exposing the bright red corium beneath. The viscera become soft, and the attachments of the bones to one another loosen so that the natural shape of the fœtus, particularly of the head, is lost. Turbid reddish fluid collects in the serous cavities and all the tissues are stained. The smell is offensive, but is not that of putrefaction. The cord and placenta are soft and friable. Putrefaction may supervene and proceed rapidly.

(2) MUMMIFICATION.—This usually affects a retained dead twin. The tissues are shrunken and tough; the skin lies almost in contact with the bones. The placenta is pale and leathery. In the case of twins the dead foetus may be compressed between the membranes of the living foetus and the uterine wall. Its thickness may be hardly more than that of parchment. Such a flattened foetus is known as a “foetus papyraceus” or “foetus compressus.”

SP. 3066A.—*Missed Abortion.*

A retained foetus of three months' development, with the placenta and membranes. The foetus is shrivelled, compressed, and distorted. The amnion is enormously thickened by myxomatous material.

SP. 3067.—*The Uterus of a Sheep containing a Dead, Decomposed, and Shrivelled Foetus.*

The ewe, when killed, was said to be in good condition. She had not brought forth the preceding season, six months before.

FÆTUS PAPYRACEUS.

SP. 3063A.—*A Compressed Foetus of three months' development.*

The foetus is one of twins, and is flattened in its own bag of membranes and lies to one side of its placenta, which is pale and of leathery consistence.

See also Sp. 3073D and 3073C.

HYDRAMNIOS.

In this condition the liquor amnii is so much in excess of the normal that the course of pregnancy is disturbed. The amount of liquor amnii does not as a rule exceed 2 pints, in hydramnios it may reach 35 to 40 pints. If the condition occurs very early in pregnancy the actual quantity of liquor may be small, but may lead to abortion. The increase of fluid is usually gradual, but sometimes occurs rapidly, producing a condition attended with grave symptoms and known as "acute hydramnios."

CAUSATION.—Since the origin of the liquor amnii is not known, the causes of its presence in excess are also unknown; it is most common with uniovular twins, and is often associated with foetal deformity, such as anencephaly and spina bifida.

SP. 3059A.—*Hydramnios*.

A foetus of one month's development enclosed in its membranes. The foetal membranes, partly covered by decidua, are distended to the size usually attained at the end of the fourth month of pregnancy, but the foetus is not larger or more developed than one of the first month. The distended sac was occupied by a large excess of liquor amnii.

OLIGO-HYDRAMNIOS.

It occasionally happens that the liquor amnii is deficient in amount. This condition is known as oligo-hydramnios.

AMNIOTIC ADHESIONS.

In oligo-hydramnios, and sometimes when the usual amount of liquor amnii is present, adhesions may form between the foetus and the amnion. These adhesions are usually formed early in pregnancy and may cause serious deformities such as encephalocele, and fissures of the face or thorax with ectopia cordis. Bands of adhesions may encircle a limb or limbs, and stopping the circulation in the part distal to the band, lead to spontaneous amputation. They may also lead to difficulty in delivery.

Sp. 3059.—*Amniotic Adhesions.*

A mature foetus. The upper and lower limbs are much distorted. The right hand has only three fingers and is connected to the left foot by a membranous band. The toes of the right foot are imperfect. Membranous bands connect the feet to the back and to each other.

HYDATIDIFORM MOLE (synonyms: vesicular mole, cystic degeneration of the chorion).

This is a disease of the chorionic villi and occurs in the early weeks of pregnancy, rarely commencing later than the end of the third or beginning of the fourth month. The chorionic stems with their branches become distended at intervals into vesicles. The resulting mass is larger than the healthy ovum so that the disease is characterised by an abnormally rapid increase in size of the uterus. The vesicles

are transparent and vary in size from a millet-seed to a hazel-nut. When the vesicles develop at the extremities of the chorionic villi, the appearance presented closely resembles a bunch of grapes, but when the dilatation occurs in the middle of the villi a chain of vesicles is formed, each vesicle being connected to the next in the row by an undilated portion of the stem. The condition usually affects the whole, but occasionally part only of the chorion, and in twin pregnancies one ovum has been found in a condition of hydatidiform mole while the other was healthy. On microscopic examination there is a profuse and irregular proliferation of the syncytium and the cells of Langhans' layer. The blood-vessels in the terminal villi are atrophied, the stroma is oedematous and the connective-tissue cells degenerate. The vesicles are filled with serous fluid.

The syncytium and Langhans' cells burrow deeply into the uterine wall, and may penetrate blood-vessels and even perforate the peritoneal coat of the uterus. Lutein cysts of the ovary are often found in association with hydatidiform mole, and half the recorded cases of chorion-epithelioma have followed hydatidiform moles.

SP. 3042A.—*Hydatidiform Mole*.

Part of a hydatidiform mole. The specimen is composed of a mass of pellucid cysts, which are attached singly to very fine branching stems or appear as chains; each cyst is attached by a fine cord to the next of the series.

SP. 3041.—*The Amnion and Chorion from a case of Hydatidiform Mole.*

The specimen has been turned inside out so that the amnion is on the outside. Its surface is raised in bosses. The umbilical cord is present but the embryo is not seen. The chorion shows the characteristic appearance of cysts united by fine cords.

See also Sp. 3037, 3038, 3039, 3040.

MYXOMA FIBROSUM.

This is a rare condition of the placenta found most often in advanced pregnancy. The lesion consists in hyperplasia of the connective-tissue core of the chorionic villi. The epithelium covering the villi is normal. The diameter of the villus may be as great as $\frac{3}{16}$ inch. The change affects parts of the placenta only, the affected portions appearing as distinct tumours.

SP. 3043A.—*Myxoma Fibrosum.*

A portion of a kidney-shaped mass which, when fresh, had the appearance of a mixed, fleshy and hydatid mole. It consists of chorion covered by decidua, and in parts by blood-clot, which extends deeply amongst the villi. A portion of the amnion is present. The villi are thickened and fleshy, and some of them show small cysts like those of a hydatidiform mole. There is no trace of the fœtus or umbilical cord.

Microscopical examination.—The thickening of the villi is due entirely to an increase of the connective-tissue core. No blood-vessels are present.

III.

ECTOPIC GESTATION.

By the term "ectopic gestation" we mean the development of the ovum in some situation other than the uterine cavity. It is a wider term than "extra-uterine gestation," for it includes cases of pregnancy in the undeveloped horn of a bicornute uterus.

CAUSATION.—It is generally believed that under normal conditions the ovum meets the spermatozoon in the Fallopian tube, and that the earliest changes of development are undergone in that situation. After impregnation the ovum travels towards the uterus, impelled partly by peristaltic contractions of the muscular wall of the tube, partly by currents set up by the cilia with which the epithelial cells of the tubal mucosa are furnished. The pathology of ectopic gestation is but little understood. Tubal pregnancy is by far the commonest variety, and for a long time the cause was sought in conditions of the Fallopian tube; the existence of ovarian gestation, however, makes it impossible to believe that the tube is at fault in all cases. The explanations offered may be grouped into three classes :

(1) Conditions of the Fallopian tube which mechanically interfere with the passage of the ovum.

(2) Atavism or "decidual reaction."

(3) Migration of the ovum.

(1) Conditions which mechanically prevent the passage of the ovum down the tube:

(a) DIVERTICULA OF THE TUBE.—Diverticula of the mucosa are frequently found in the muscular walls of the healthy tubes. They may attain a length of several millimetres, and after running parallel to the lumen of the tube end in a *cul-de-sac*. If a fertilised ovum in its course towards the uterus enters one of these diverticula it will become arrested and tubal gestation result.

(b) ACCESSORY TUBES.—It is not uncommon to find small secondary tubes attached to the main tube in the region of the abdominal ostium. If a fertilised ovum enters such a tube it may be arrested (see Sp. 2915B).

(c) TUMOURS OF THE TUBE.—Adenomatous polypi have been found partially or completely occluding the lumen of a pregnant tube.

(d) PELVIC INFLAMMATION.—In chronic salpingitis the tube-wall is thickened by the formation of fibrous tissue; the presence of this fibrous tissue may interfere with the peristaltic movements. Secondly, in some cases there is loss of the ciliated epithelial lining with a diminution in the strength of the ciliary current. In the third place the plicæ of the tubal mucosa often adhere together by their edges and may thus form crypts or depressions—"the sub-plical spaces"—in which an ovum may lodge. And

finally, the tubal lumen may be constricted or occluded by bands of peritoneal adhesions passing from one viscus to another. It is clear, therefore, that tubal inflammation may bring about conditions which tend to prevent the passage of the ovum towards the uterus, but the association of tubal gestation with salpingitis is not so frequent as was at one time believed (see Sp. 2952B).

(2) THE THEORY OF ATAVISM OR DECIDUAL REACTION may be briefly stated thus: The simplest form of the genital canal is found in certain non-mammalian animals where there is no distinction between an oviduct and a uterus; in such animals ova may develop in any part of the tract. In the higher animals the upper portion of the Müllerian duct has become differentiated into a Fallopian tube whose function is merely that of conveying the ova, and a uterus whose function is to form a nidus for the developing ovum. Decidual tissue is to be regarded as essential for the attachment and development of the young ovum, and in animals in whom the Müllerian duct has undergone this differentiation the power of forming a decidua has been lost in the upper or ovum-conducting portion. The tubal mucosa, however, occasionally shows a reversion to type and possesses to some extent the power of decidual reaction. Under such conditions the ovum may become implanted and develop in the tubal mucosa.

(3) MIGRATION OF THE OVUM.—An ovum from one ovary may enter the Fallopian tube of the opposite side; to this phenomenon the term “migration of the

ovum" is applied. It is suggested that under these conditions the ovum may have attained an unusual degree of development, and already possessing a covering of trophoblast before it reaches the uterine cavity may bore its way into the tubal mucosa.

CLASSIFICATION.—Theoretically, the fertilised ovum may be arrested at any point between the ovary and the uterine cavity. Ovarian gestation, tubal gestation, and gestation in the rudimentary horn of a bicornute uterus are well known, but at present it is doubtful if the ovum ever meets the spermatozoon in the abdominal cavity (primary abdominal gestation).

TUBAL GESTATION.

The ovum may develop in—(1) the interstitial portion of the tube (Sp. 3075); (2) the isthmus (Sp. 3072A); (3) the ampulla (Sp. 3071); (4) the infundibulum. Of these varieties ampullary pregnancy is the commonest. The ovum is implanted upon the tubal mucosa, and by the destructive action of the trophoblast bores its way into the depth of the membrane. Once implanted in the mucosa the ovum develops until eventually there is formed a foetus surrounded by its membranes and floating in liquor amnii. Simultaneously with the development of the embryo changes are found in the tube and the uterus.

CHANGES IN THE TUBE. (1) INCREASED VASCULARITY.—The arteries and veins hypertrophy, the walls

are thickened, and the endothelial lining proliferates.

(2) CHANGES IN THE MUCOSA.—No continuous lining membrane comparable to the decidua of an intra-uterine pregnancy and cast off with the expulsion of the ovum forms in the tube, but scattered groups of connective-tissue cells of the tubal mucosa undergo a change similar to that undergone by the connective-tissue cells of the endometrium.

(3) CHANGES IN THE FIBRO-MUSCULAR WALL.—The wall of the tube possesses very little power of hypertrophy. In the early stages the individual muscle-fibres of the wall increase in size, but there is no evidence of the formation of new muscle-cells. The wall, however, becomes thicker from increased vascularity, from œdema, and from an increase in the connective tissue between the muscle bundles. The development of the wall fails to keep pace with the growth of the ovum, and consequently becomes stretched and thinned.

(4) CLOSURE OF THE ABDOMINAL OSTIUM.—When the ovum is embedded in the ampulla of the tube the abdominal ostium usually becomes closed; when the ovum is embedded in the isthmus the ostium remains patent. The closure is brought about by the peritoneal margins of adjacent fimbriae becoming adherent to one another and gradually contracting over the ostium, sealing and occluding it (see Sp. 3072E).

CHANGES IN THE UTERUS.—The uterus increases in size by hypertrophy and hyperplasia of both its muscular walls and mucosa. The cervix is softened

and usually remains so as long as the foetus is alive. The mucosa undergoes a series of changes similar to those of intra-uterine pregnancy and is converted into a true decidua. The separation and expulsion of the decidua may occur at any time during the pregnancy. The event is often, though by no means invariably, an indication of the death of the foetus. See Sp. 3071 and 3072B.

SP. 3100B.—*Decidual Cast of the Uterus from a Case of Tubal Gestation.*

A complete cast of the uterine cavity composed of decidual tissue. The specimen is a fleshy mass with a shaggy surface. It is roughly triangular in shape, the angles corresponding to the uterine cornua and the cervix respectively.

Microscopical examination.—The cast is composed of decidual tissue and contains no foetal structures.

From a woman, aged 23, who, after six weeks' amenorrhœa, was seized with acute abdominal pain, accompanied by vaginal hæmorrhage. At operation a mole was found in the left Fallopian tube.

NATURAL HISTORY OF TUBAL GESTATION.

(1) The commonest mode of termination of tubal pregnancy is the formation of a tubal mole. Such a mole may remain encysted in the tube, giving rise to a condition of hæmatosalpinx, may escape through the patent abdominal ostium (tubal abortion), or may lead to rupture of the tube.

(2) The tube may rupture without the formation of a mole.

(3) As the ovum develops it may grow mainly towards the abdominal ostium, distending the infundibulum and protruding into the peritoneal cavity. In its growth it may become attached to surrounding structures—the peritoneum, the intestines, or the ovaries. To this variety the terms “tubo-abdominal” and “tubo-ovarian” are applied.

(4) Very rarely the gestation advances to full term with the ovum still enclosed in the Fallopian tube.

TUBAL MOLES are almost invariably formed within the first two months of gestation. They vary from one to eight centimetres in circumference, and in their external appearances are indistinguishable from laminated blood-clot; on section the smooth-lined amniotic cavity is seen, sometimes containing a shrunken or deformed foetus. The explanation of the formation of such a mole is to be found in the activity of the trophoblast. The villi penetrate the thin layer of tissue separating the ovum from the lumen of the tube, and the blood circulating in the chorio-decidual space escapes into the tube. If the abdominal ostium be open the blood will pass into the peritoneal cavity; if closed the tube will either become distended and form a hæmatosalpinx or will rupture. In any case the ovum is cut off from its vital connection with the tube-wall and is incapable of further development. In some instances no amniotic cavity is visible, and the mole is apparently composed entirely of blood. This appearance is produced when the membranes give way and blood is effused into the amniotic cavity; the true

nature of such a mass is revealed by the presence of chorionic villi in the blood-clot.

SP. 3072D.—*Tubal Mole.*

Section of the Fallopian tube containing a tubal mole. The tube is dilated and filled with blood-clot partially decolourised. The fimbriated end of the tube, seen at the top of the specimen, is closed. No amniotic cavity is visible.

The patient, a woman aged 40, had missed two periods, and was admitted into hospital on account of pain and bleeding, which had occurred intermittently for the previous fortnight. At operation a quantity of blood was found free in the peritoneal cavity.

SP. 3077D.—*Tubal Mole and Broad Ligament Cyst.*

A cyst of the right broad ligament over which is stretched a gravid Fallopian tube. The cyst is the size of a goose's egg and contained clear fluid; a window has been cut in its wall to display a swelling of the Fallopian tube the size of a filbert which projects into the cyst cavity. An incision made in the long axis of the swelling has allowed a mass of blood-clot to protrude. The fimbriæ of the tube adhere to one another and to the cyst-wall. At the lower part of the specimen is seen the pedicle consisting of the broad ligament.

Microscopical examination.—The contents of the swelling consist of blood-clot in which are embedded chorionic villi.

TUBAL ABORTION.

When the abdominal ostium remains patent the mole may escape through it into the peritoneal cavity. Tubal abortion is most common in ampullary pregnancy and is the most frequent mode of termination of tubal gestation. The process is strictly analogous to that of uterine abortion, contractions of the tube leading first to dilatation of the infundibulum, then to expulsion of the ovum. After expulsion the tube-wall retracts and hæmorrhage is arrested. The abortion is associated with some degree of hæmorrhage; the blood escaping from the abdominal ostium passes downwards into Douglas's pouch and forms a hæmatocele; if the hæmorrhage occurs very rapidly or is excessive the blood may be diffuse in the abdominal cavity.

INCOMPLETE TUBAL ABORTION.

In these cases part of the mole is in the tube and part projects through the abdominal ostium. So long as this condition persists hæmorrhage from the tube-wall continues.

SP. 3072F.—*Tubal Abortion.*

A Fallopian tube removed by operation from a case of tubal gestation. The inner portion of the tube (the isthmus) preserves its normal appearance, but the outer portion (the ampulla) is greatly distended and its wall thinned. At one point a minute perforation is seen. The abdominal ostium is widely dilated. The dilated portion had been occupied by an ovum which had recently been

expelled through the abdominal ostium into the peritoneal cavity.

PRIMARY RUPTURE OF THE TUBE.

Primary rupture of the tube is the second commonest mode of termination. It may occur within a fortnight of conception, or, in cases of interstitial pregnancy, may be delayed as late as the fourth month. In the vast majority of cases it occurs within ten weeks, and is usually earlier in isthmic than in ampullary pregnancies. Of the factors which determine rupture two are of the greatest importance: (1) The eroding action of the trophoblast; (2) the failure of hypertrophy of the tube-wall.

In some cases we see a small clear-cut aperture in the wall of the gestation sac through which chorionic villi protrude. In such cases the rupture is directly due to the process of erosion of the villi.

SP. 3072.—*The Uterine Appendages of the Right Side from a Case of Tubal Gestation.*

A gestation sac $1\frac{1}{4}$ inches in length occupies the central portion of the Fallopian tube. On the surface is an irregular aperture through which chorionic villi protrude. The ovary is unusually long and narrow, preserving the foetal form, and contains at its free pole a large corpus luteum.

From a patient who was seized with abdominal pain in the seventh week of her tenth pregnancy, and died from internal hæmorrhage ten hours later.

In other cases we find an irregular ragged tear

as though the thinned wall had given way under the influence of gradual stretching.

SP. 3071A.—*A Uterus and its Appendages, from a Case of Tubal Pregnancy.*

The right Fallopian tube is distended at the outer extremity by the development of an embryo within it. The cyst containing the foetus has a large ragged opening about $1\frac{1}{4}$ inches long on its upper part; the surrounding tissues are stained with blood; the foetus is of about five weeks' growth. There is no marked enlargement of the uterus, and its lining membrane is not hypertrophied.

From a woman who thought herself four months pregnant. She was seen at Stirling Infirmary, where she complained of losing blood *per rectum* for some time; she was very anæmic. Death ensued thirty-six hours after admission. A large quantity of clotted blood was found in the abdomen. The foetus had probably died some months earlier, and the uterus had undergone the process of involution.

SP. 3072E.—*Ruptured Tubal Gestation.*

A left ovary and Fallopian tube from a case of tubal gestation. The ampulla of the tube is occupied and distended by a mass of blood-clot. The abdominal ostium is closed. On the anterior aspect is an irregular tear 1 inch in length.

Removed by operation from a woman, aged 27. The patient was pregnant for the first time, and had last menstruated six weeks before the onset of the symptoms leading to the operation.

These were a sudden attack of abdominal pain and vomiting, attended by slight bleeding from the vagina; the symptoms recurred with increased severity on the second day of the illness. Laparotomy was performed, the Fallopian tube was removed, and the patient made a good recovery.

Rupture may also result from direct violence, as from a fall or blow or during pelvic examination; or may follow the sudden distension of the tube with blood which accompanies the formation of a mole.

SITE OF RUPTURE.—Rupture of the tube may be intra- or extra-peritoneal. If the rent is situated in the part of the tube closely invested by peritoneum the rupture will be “intra-peritoneal” (see Sp. 3072E). If in the part of the tube situated nearest the base of the broad ligament not closely invested by peritoneum, “extra-peritoneal” (see Sp. 3077c). In the latter case the blood effused, and the ovum, if expelled, will lie between the two layers of the broad ligament shut off from the peritoneal cavity.

INTRA-PERITONEAL RUPTURE.

In this variety hæmorrhage occurs into the peritoneal cavity, and may be so profuse as to lead to the death of the patient within an hour or two. The ovum may escape through the rent or may remain within the tube. Whether the ovum perishes or survives depends mainly upon the amount of dislocation of the placenta. If it be separated through the greater part of its extent the fœtus dies; if the separation be only slight, the fœtus,

protruded through the rent, may continue its development in the abdominal cavity. If the pregnancy continue a new "secondary gestation sac" is formed, consisting in part of the expanded and ruptured tube and in part of the foetal membranes adherent to intestines and surrounding viscera.

SP. 3071.—*A Uterus and its Appendages showing a Ruptured Gestation Sac in the Right Fallopian Tube.*

The ampulla of the tube is dilated into a sac which contains the foetus and its membranes. On the posterior aspect of the sac is a small irregular opening through which chorionic villi protrude. On its anterior aspect the tube has been laid open to display the embryo and its membranes. The abdominal ostium is closed by adhesions between the fimbriae. In the right ovary is seen a corpus luteum (marked by a bristle), and also a follicular cyst the size of a filbert. The appendages of the left side are normal. The uterus is enlarged, its walls are thickened, and the peritoneum covering its posterior aspect is shaggy from adhesions, the result of previous inflammation. The uterus has been laid open on its anterior aspect, and the cavity, lined by a thick decidua, is displayed. Bristles are passed through the Fallopian tubes into the cavity.

Removed from the body of a woman who died from internal hæmorrhage during the seventh week of her pregnancy. A large quantity of blood was found in the peritoneal cavity.

A drawing of the specimen is preserved, No. 519.

SP. 3072A.—*The Uterus and Appendages from a Case of Tubal Gestation.*

The isthmus of the right Fallopian tube forms a gestation sac, in which is seen a mass of blood-clot and chorionic villi. In the wall of the portion of the sac nearest to the ovary is a small rupture through which chorionic villi protrude. Both ovaries contain small follicular cysts. The uterus shows no evidence of hypertrophy, but its mucosa is thickened.

SP. 3072B.—*The Uterus and its Appendages showing early Tubal Gestation.*

The isthmus of the left Fallopian tube is dilated to form a gestation sac $\frac{3}{4}$ inch in length, thin on its anterior aspect, thicker posteriorly. An aperture on its anterior aspect through which chorionic villi protrude marks the site of the rupture. The sac contains a small ovum covered by chorionic villi. The abdominal ostium is patent. The uterus and appendages are covered with shaggy peritoneal adhesions, the result of former inflammation. The uterus is slightly enlarged; its cavity measures $2\frac{3}{4}$ inches in length and is lined by a thick decidua. The cervical canal is occupied by a plug of mucus. Corpora lutea are seen in both ovaries.

Removed from the body of a woman, aged 28, who had missed one menstrual period. She was suddenly seized with great abdominal pain. When seen she was pallid, but conscious; the abdomen was slightly distended and tender. The patient

died from hæmorrhage into the peritoneal cavity fifteen hours after the first symptom.

SP. 2940. — *The Uterus and Appendages from a Case of Tubal Gestation.*

Occupying the ampulla of the right Fallopian tube is a gestation sac the size of a walnut; this has been opened on its anterior aspect displaying a mass of blood-clot. A rupture $\frac{1}{3}$ inch in length is seen at the upper part of the sac. The uterus is hypertrophied and is lined by a decidua.

From a patient aged 25, who, while in hospital for the treatment of warts on the vulva, suddenly developed the symptoms of internal hæmorrhage, and died in twelve hours. At the post-mortem examination the cavity of the peritoneum contained five pints of recently effused blood, and dark fluid blood oozed slowly from the opening in the gestation sac.

EXTRA-PERITONEAL RUPTURE.

Extra-peritoneal rupture is a rare event. The tubal contents are extruded into the space between the two layers of the broad ligament. If the ovum perish the space is occupied by a mass of blood-clot termed "a broad ligament hæmatoma." If the ovum continue to grow the peritoneum is gradually stripped up from either the anterior abdominal or the pelvic wall as the gestation sac continues to enlarge.

SECONDARY RUPTURE OF THE GESTATION SAC.

The sac of an intra-peritoneal or of a broad ligament pregnancy may give way at any time between the formation of the secondary sac and full term, but such an event is rare after the first half of pregnancy has been completed. Such rupture usually occurs into the peritoneal cavity and is a very fatal event.

SP. 3072G.—*Intra-peritoneal Rupture of a Secondary Broad Ligament Pregnancy.*

An ovary, Fallopian tube, and broad ligament of the left side, showing rupture of an extra-uterine gestation sac. The two layers of the broad ligament are separated by a gestation sac the size of an orange. On the posterior aspect of the sac is an irregular tear, through which the foetus escaped into the peritoneal cavity. The interior of the sac is smooth and lined by amnion. A well-formed placenta is attached to its anterior and inferior wall. The Fallopian tube is stretched over the sac, and its abdominal ostium is widely dilated; from each extremity of the tube a glass rod has been passed into the cavity of the sac. The ovary, divided to show a large corpus luteum, is seen near the free end of the tube. The appearance of the foetus corresponds with that of the tenth to the twelfth week of gestation.

Removed by operation from a woman aged 35, who, after six weeks' amenorrhœa, suffered three times in one month from attacks of abdominal pain, the first attended by slight discharge of blood from

the vagina. A fourth attack was accompanied by symptoms of collapse and internal hæmorrhage which led to the operation. The patient made a good recovery.

SP. 3077c.—*The Pelvic Viscera from a Case of Ruptured Secondary Broad Ligament Gestation.*

The right broad ligament is distended to form a gestation sac lined by placenta and foetal membranes. The embryo has escaped through a rent in the upper part of the sac. The right Fallopian tube cannot be identified, but the ovary, containing a corpus luteum, is seen below the sac. The uterus is hypertrophied and displaced to the left. The appendages of the left side are adherent to one another, the tube is thickened and its abdominal ostium closed. The right half of the bladder and vagina have been removed.

From a patient aged 32, who had been married for eleven years without any previous pregnancy. Her last menstrual period occurred in March, 1889; in April there was a slight hæmorrhage, and from that time no further bleeding. From May onwards she suffered from attacks of vomiting and abdominal pain. In July a pelvic tumour was detected to the right of the uterus and abdominal section performed. Death occurred from shock one hour after the operation.

SP. 3074.—*The Uterus and Appendages from a Case of Ruptured Secondary Broad Ligament Gestation.*

The two layers of the right broad ligament are

separated by a gestation sac over which runs the Fallopian tube. Its fimbriated extremity cannot be identified. The sac has ruptured on its posterior aspect, and the outer wall has been divided exposing the cavity lined by amnion. The placenta, partially detached, projects through the opening. The foetus, still attached by its cord, appears to be of three months' development. The right ovary is seen below the sac and contains a corpus luteum. The uterus is hypertrophied, its walls are thickened, and their inner surface shaggy from detachment of the decidua. The left appendages are covered by adhesions, the result of previous peritonitis.

SP. 3073.—*The Uterus and Appendages of the Right Side from a Case of Ruptured Extra-uterine Gestation.*

In the situation of the right broad ligament is a gestation sac measuring 3 inches in diameter. The sac has been laid open displaying the foetal membranes and placenta. The foetus, still attached by its cord, is shrivelled and compressed. The posterior aspect of the uterus and sac are covered with small masses of blood-clot.

SECONDARY EXTRA-PERITONEAL RUPTURE OF THE GESTATION SAC.

Occasionally, after the death of the foetus and as the result of infection, suppuration occurs in the secondary gestation sac; an abscess may then point beneath the abdominal wall or at the vaginal vault.

SP. 3073B.

The specimen shows a foetus of probably five months' development, removed by operation from the abdominal cavity. Note the general shrivelled appearance, the peeling epidermis, and the staining of the skin with blood-pigments. The extremities, especially the feet, are poorly developed.

The specimen was removed by operation from a woman who had not previously been pregnant. Symptoms of pregnancy commenced twelve months before admission. The abdomen increased in size for five months and then grew smaller, but for three months before admission again increased. The catamenia during this period were irregular. Two months before admission the patient experienced abdominal pain and difficulty in micturition. At the operation a cyst with friable walls was found containing two pints of stinking pus and the foetus above described. The patient recovered. The abscess was pointing beneath the anterior abdominal wall.

If the foetus survive the accident of primary rupture and the sac escape secondary rupture, gestation may advance to full term.

PELVIC HÆMATOCELE.

Tubal abortion and tubal rupture are attended by the escape of blood into the peritoneal cavity. If the blood escapes rapidly it remains free in the abdominal cavity, but if it escapes slowly it may

collect in the pouch of Douglas, the most dependent part of the body, and there form a definite rounded tumour termed a pelvic hæmatocele. The boundaries of such a tumour are : In front, the posterior wall of the uterus and broad ligaments ; behind, the peritoneum covering the anterior surface of the rectum and sacrum ; laterally, the reflections of peritoneum on to the side walls of the pelvis ; and below, the utero-rectal fold of peritoneum. Above it has no definite anatomical boundary, but is cut off from the general peritoneal cavity by adhesions of the intestine and omentum.

At first the hæmatocele consists of fluid blood and feels elastic on vaginal examination ; subsequently the blood clots and the tumour becomes harder. A hæmatocele is usually slowly absorbed until ultimately no traces of it can be discovered clinically ; more rarely, as the result of infection (probably through the bowel), an abscess forms and may rupture into the posterior vaginal fornix or the rectum.

DEVELOPMENT TO FULL TERM.

If at the primary rupture of the tube the placental attachment is not greatly disturbed, the foetus, still covered by its amnion, and sometimes by chorion also, may protrude through the rent and continue its development in the abdominal cavity, a secondary gestation sac being formed by adhesion of the foetal membranes to omentum, intestine, and other viscera. The secondary gesta-

tion sac may escape rupture and the pregnancy reach full term. At the end of the period of gestation "spurious labour" ensues. The uterus contracts rhythmically and pains like labour pains are experienced, persist sometimes for a day or two, then pass off. The foetus perishes, the liquor amnii is slowly absorbed, and the gestation sac shrinks.

FATE OF THE FŒTUS.

A foetus which has perished and is retained in an extra-uterine gestation sac is liable to a variety of changes :

(1) SUPPURATION.—The sac may suppurate as the result of infection from the bowel (specimen, see 3073B).

(2) MUMMIFICATION. — The foetal tissues may become shrivelled and dry. A foetus in this condition has been carried in the peritoneal cavity for fifty years without causing grave symptoms.

SP. 3068.

One of the lower limbs of a foetus of mature growth which was contained in an osseous cyst, and remained in the abdomen of the mother for fifty-two years. A portion of the cyst-wall is connected with the limb; their surfaces were perfectly adherent, but have been partially separated. The several tissues of the limb are dry and compressed.

The patient was 80 years old when she died. Fifty-two years before she had signs of pregnancy, and then of labour; but the latter passed off at the end of a week. She continued very weak for three months; but from that time till she was affected

with gangrena senilis she had good health. The case is described by Dr. Cheston in the 'Medico-Chirurgical Transactions,' vol. v, p. 104, London, 1814. Other portions of the same foetus are in the Museum of the Royal College of Surgeons of England.

(3) CALCIFICATION.—Lime salts may be deposited in the tissues of the sac and foetus, which are thus converted into a hard, stony mass known as "lithopædion."

(4) ADIPOCERE FORMATION.—The foetus may be converted into a hard, greasy, white or yellow substance known as "adipocere." This substance is formed in a warm, moist environment by the combination of fatty acids with ammonium salts (see Sp. 1426).

INTERSTITIAL PREGNANCY.

It is comparatively rarely that the ovum is embedded in that part of the tube which traverses the wall of the uterus. Because the ovum is invested not only by the tube but also indirectly by the uterine muscle, the muscular wall of the gestation sac is capable of a considerable degree of hypertrophy, and consequently rupture may be delayed until the pregnancy has advanced three or four months. Such cases are almost invariably fatal from the great amount of blood lost, for the rupture usually involves the uterine wall.

SP. 3075.—*A Uterus and its Appendages from a Case of Tubal Gestation.*

The interstitial portion of the right Fallopian tube is dilated to form a gestation sac. The walls

of the sac are hypertrophied, and their structure resembles that of the pregnant uterus. A rupture involving half the circumference has occurred at the outer portion, and through it protrudes a foetus still enclosed in its membranes, and of apparently between three and four months' gestation. The placenta has undergone but little separation, and still remains attached to the walls of the sac. The extra-mural portion of the tube is continuous with the sac; the round ligament is attached to its anterior and inferior aspect. The right ovary contains a corpus luteum. The uterus is enlarged, its walls are hypertrophied, and its cavity lined by a decidua. The appendages of the left side show evidence of past pelvic inflammation.

A section of the mucosa containing large decidual cells is preserved in the Histological Series XLVI.

Sudden death occurred from rupture of the gestation sac.

CORNUAL PREGNANCY.

The uterus is formed by the fusion of the two Müllerian ducts; sometimes the fusion is incomplete, and a bicornute uterus results. If the two horns are equally developed (see Sp. 3673A) pregnancy usually advances to full term, and the child is delivered naturally. It sometimes happens that whilst one horn is well formed the other remains small and rudimentary (see Sp. 3674A). Should the ill-developed horn become gravid one of two events may occur:

(1) The horn may hypertrophy and develop to

such a degree that it forms a muscular sac capable of containing the foetus and its membranes up to full term.

(2) The horn may rupture.

In the former event no untoward symptoms may occur during pregnancy, and the patient may be unconscious that there is anything wrong up to the time of labour. Since such a horn seldom communicates with the uterine cavity delivery *per vias naturales* is impossible. The patient suffers labour pains sometimes for two or three days, but no foetus is expelled. After this spurious labour the foetus dies, the liquor amnii is absorbed, and the gestation sac shrinks.

SP. 3078A.—*Pregnancy in an Ill-developed Uterine Horn.*

A uterine horn, containing a full-term foetus, placenta and membranes. The mass is globular and covered with peritoneum, except over a narrow sinuous area, 6 inches long, where it was attached to the broad ligament. At one extremity of this bare space is the Fallopian tube and ovary. The ovarian ligament passes directly to the wall of the sac. An incision has been made into the cavity, showing the foetus and placenta *in situ*.

The patient was a multipara, aged 27, who believed that she became pregnant in March, 1901. In January, 1902, painful uterine contractions were experienced, and after that no foetal movements were felt. On May 2nd, 1902, the tumour was removed by operation.

SP. 3078A₁.—*Cornual Pregnancy reaching Full Term.*

A gestation sac, probably an expansion of the undeveloped horn of a bicornute uterus, containing a post-mature child. The sac is covered by a serous membrane like peritoneum, with the exception of a sickle-shaped area, 6 inches long, situated obliquely along the left side of the specimen. This area is bare, and marks the site of the pedicle of the tumour. Along it run blood-vessels which carried the main blood supply to the gestation sac. There is no trace of an ovary, nor anything which can be identified as a Fallopian tube. An incision has been made to expose the child, and passes in its lower part over the edge of the placenta, the bulk of which is situated to the left of the opening. The child appears perfectly formed. Its finger-nails protrude for more than a quarter of an inch beyond the ends of the fingers indicating a condition of post-maturity. The outer wall of the sac is rendered shaggy by many omental adhesions.

Removed by operation from a multipara, aged 35, whose last child was born ten years previously. Pregnancy of three months' duration had been diagnosed thirteen months before the date of the operation, and foetal movements were felt until six months before operation. No child was born, and the persistent enlargement of the belly brought the patient under notice sixteen months from the commencement of the pregnancy. She was in good bodily health. The condition of the breasts did not suggest pregnancy, and the menstrual history was

one of irregularity "for some months." The cervix uteri was hard, and the sound passed $4\frac{3}{4}$ inches in front of the tumour. At the operation the uterus was found to be enlarged and the appendages on the right side natural. Those of the left side could not be identified. The patient made a good recovery.

(2) The ill-developed horn may not possess this power of hypertrophy, but failing to accommodate the foetus may rupture.

SP. 3078A₂.—*Ruptured Cornual Gestation.*

The uterus is enlarged to the size of a two and a half months' gestation. The appendages on the left side are normal. On the right side there is a gestation sac separated from the uterus by a thick band of tissue. The upper part of the sac has ruptured and permitted the escape of the foetus in its membranes. This process was apparently gradual as the omentum is seen to be firmly adherent along the edge of the rent. The uterine end of the tear is deeper and has exposed the placenta, which in the recent state was covered with fresh blood-clot. The corpus luteum is in the right ovary (seen below the posterior aspect of the specimen). The foetus is of about four months' gestation. From the attachment of (*a*) the round ligament (under which a coloured rod had been placed) and (*b*) of the ovarian ligament to the gestation sac it is plain that the ovum has developed in the rudimentary horn of a bicornute uterus.

A section for microscopical examination was taken

from the isthmus of tissue joining the gestation sac to the uterus. No communicating canal between the two could be detected.

Sp. 3078.—*Pregnancy in the Undeveloped Horn of a Bicornute Uterus.*

A bicornute uterus and its appendages from a case of ectopic gestation. The right undeveloped horn is the site of a gestation sac which contained a three months foetus. The sac is smooth, covered by peritoneum, and in its general characters resembles the uterus. At its outer part is a rent 3 inches long through which the foetus has escaped. The placenta is still attached to the sac-wall; the membranes are ruptured and project through the tear. The right ovary contains a corpus luteum. The undeveloped cornu joins the uterus a short distance above the level of the os internum. The well-developed round ligament is attached to the anterior and inferior portion of the sac, the ovarian ligament to its posterior wall. The left horn is enlarged, its walls hypertrophied, and its cavity lined by a decidua. The appendages of the left side are normal except for the presence of a small pedunculated cyst.

From the body of a woman who died during the third month of her pregnancy.

Clinically the diagnosis between tubal and cornual pregnancy is usually impossible, but when a specimen is examined after removal certain anatomical features enable us to distinguish between the two conditions:

(1) The situation of the round and ovarian ligaments. These structures are always attached to

the uterine cornua, never to the tube, consequently in tubal pregnancy they are always inserted *internal* to the gestation sac ; in cornual pregnancy they are attached to the wall of the sac.

(2) The tube is inserted into the upper angle of the uterus, but an undeveloped horn is attached much lower down, most often near the level of the os internum.

(3) In cornual pregnancy a complete tube with infundibulum, ampulla and isthmus is found external to the gestation sac. All these points are well seen in Sp. 3078A₂ and 3078.

OVARIAN GESTATION.

The possibility of fertilisation and development of an ovum within the ovary is now definitely proved. The ovary possesses remarkable powers of accommodating itself to the growing ovum and rupture may be delayed until late. More often, however, rupture occurs within the first few weeks.

SP. 3077.—*Simultaneous Intra- and Extra-uterine Gestation reaching Full Term.*

The uterus and adjacent parts from a case of combined extra- and intra-uterine gestation. The uterus presents the appearances usually seen at the termination of the third stage of labour. The right Fallopian tube is elongated and stretched over the surface of a gestation sac ; its abdominal ostium cannot be identified. The sac, at least in part, is situated between the two layers of the broad ligament. The placenta and membranes are seen *in*

situ ; the former is situated on the anterior and upper aspects of the sac.

From a woman, aged 39, who had previously borne three children. Beyond an unusual degree of distension of the abdomen there were no abnormal symptoms during pregnancy. Labour was obstructed by a hard tumour situated behind the uterus. Under anæsthesia this was pushed out of the pelvis, and the child delivered by version. Post mortem it was found that the tumour was the head of a second child occupying a gestation sac to the right of the uterus.

IV.

THE PLACENTA.

THE primitive villi over the chorion frondosum grow rapidly, and branch to such an extent that eventually each villus becomes a tree-like structure with a relatively thick trunk and many branches. Loops of the capillaries joining the arterioles of the umbilical artery and the radicles of the umbilical vein extend into the terminal branches. Since the villi are bathed in maternal blood, and have only thin walls, there is a free interchange of substances in solution between the foetal and maternal blood.

The placenta is the organ of nutrition, of respiration, and of excretion for the foetus.

SP. 1294.—*Part of a Placenta, teased out to show the branching Chorionic Villi.*

THE CHORIO-DECIDUAL SPACE is situated over the placental site between the maternal decidua and the foetal chorion. It is limited at the placental margins by firm adhesion between the membranes and the uterine wall. Maternal vessels, both arteries and veins, open into it. A constant stream of maternal blood passes through it. The chorionic villi are bathed in this stream of blood; some are attached

by their extremities to the decidua ("fastening villi"), others are free at their distal extremity and float in the maternal blood like watercress in a stream. The function of the chorio-decidual space is to bring about the intimate relation essential for the interchange of substances between the foetal and maternal blood.

By the end of the fifth month the placenta has attained its highest degree of development and its closest union with the uterine wall. From this time onwards we find evidence of degenerative changes preliminary to its separation and expulsion during parturition. The double layer of foetal epiblast covering the villi during the earlier months is replaced by a single layer, and by the end of the seventh month some of the branches of the umbilical artery are occluded by a process of obliterating endarteritis. As the result of the diminution in the vascular supply groups of villi atrophy, and fibrin from the maternal blood is deposited upon them. Such groups of atrophied villi (seen as yellowish-white patches in the placental tissue) are known as "infarcts."

ANATOMY.—The placenta presents for examination two surfaces and a margin. The maternal surface is of a dull red colour, and granular to the touch. It is divided into from twelve to twenty areas, called "cotyledons," separated from each other by deep sulci. The foetal surface is smooth, shiny, and covered by the amnion. This membrane can, however, be easily stripped off the organ as far as the insertion of the cord. From this point onwards it is

adherent to the cord throughout its length. The margin of the placenta is thin and sharp. A vein can be made out encircling part or more rarely the whole circumference of the organ close to the edge. It is called the circular sinus.

The umbilical cord has an average length of 20 inches, and is attached to the placenta eccentrically. It consists of an outer covering of amnion, enclosing a central core of jelly (the Whartonian jelly), in which are embedded the umbilical vessels, two arteries and one vein. The remains of a second vein, the vitelline duct (the duct of the yolk-sac) and the allantois can sometimes be made out. The cord is twisted spirally, the direction of the twists being in the opposite direction to those of a corkscrew (*cf.* Sp. 1306).

Somewhere between the umbilicus and the margin of the placenta a small pear-shaped object can occasionally be made out. It represents the remains of the umbilical vesicle or yolk-sac. In Sp. 1293A the yolk-sac is seen as a small stalked body close to the margin of the placenta.

The membranes consist, from within outwards, of amnion, chorion, and part of the decidua; the two last are attached to the margin of the placenta. The amnion is thin, tough and shiny on the foetal surface. It is semi-transparent. The chorion is thicker than the amnion, but is weaker, less elastic and more opaque. The decidua is seen in the form of small separate sheets and tags of tissue attached to the maternal surface of the chorion. It does not form a complete membrane.

ABNORMALITIES OF THE PLACENTA AND THE CORD.

A. ABNORMALITIES OF THE PLACENTA.

(1) PLACENTA DUPLEX, TRIPLEX, ETC.

The placenta in a single pregnancy may be divided into two or more separate parts. As many as seven separate portions have been described.

(2) PLACENTA SUCCENTURIATA.

In this variety small masses of placental tissue are found on the chorion separated from the main placenta by an interval. The blood-vessels supplying the succenturiate portion traverse the intervening membranes.

(3) PLACENTA MEMBRANACEA.

In this condition the chorion frondosum is much larger, consequently the full-term placenta is spread out and occupies a large portion of the membrane. The placenta does not usually cover the lower part of the ovum, so that no abnormality is discovered until the expulsion of the after-birth.

(4) INFARCTS OF THE PLACENTA.

"Infarct" is the term applied to masses of fibrinous or fibrous tissue found in the placenta. Such infarcts appear as white masses on either the foetal or maternal aspect of the placenta. A number of such small infarcts are seen on the foetal surface of Sp. 1299b, and also in the section of the

placenta in Sp. 1299E. More rarely the infarct may form a large mass involving several cotyledons, as in Sp. 3044A.

Infarct formation is the result of degenerative changes occurring in the chorionic villi. The first step in the production of an infarct is an obliterating endarteritis of the arterioles of the villi affected. Degeneration of the tissues of the villi is followed by coagulation of the maternal blood surrounding them, and eventually the mass is converted into fibrous or hyaline material. Death of the foetus may result from interference with the function of a large part of the placenta. A special variety of infarction involving more or less completely the circumference of the foetal surface of the placenta is found occasionally. A placenta so affected is surrounded by a band of whitish fibrous tissue as much as $1\frac{1}{2}$ inches in width. It is known by the name of "placenta marginata" (*cf.* Sp. 1299D).

SP. 3044A.—*Portion of a Placenta with its Cord.*

The uterine surface is broken up into irregular masses from 1 to 2 inches thick. The largest portion is divided and shows a solid white mass. Under the microscope this is seen to be composed of fibrous tissue.

(5) INFLAMMATORY DISEASES.

With the exception of syphilis inflammatory affections are rare. A few cases of tuberculosis have been recorded. Syphilis produces definite and characteristic changes. The placenta appears larger and paler than usual. The villi become thicker and

less branched, the stroma more cellular and the blood-vessels less apparent.

(6) CALCAREOUS DEGENERATION OF THE PLACENTA.

Nodules and plaques of calcareous matter are frequently found on the maternal surfaces of the placenta. Occasionally they are very numerous and give the placenta a gritty feel.

(7) CYSTS OF THE PLACENTA may be found in two situations :

(a) Immediately beneath the amnion ;

(b) In the substance of the placenta.

(a) Those immediately beneath the amnion are often multiple. The roof is formed by the chorion and the floor by the surface of an infarct, which may or may not be covered by a layer of cells derived from the trophoblast. The cyst contents are derived from degeneration of the trophoblast, or of the infarct, or from subchorionic hæmorrhage. They usually contain a clear serous fluid, but may be coloured by blood, the colour varying from pale yellow to dark brown.

SP. 1299B.

The amnion has been stripped off from the foetal surface of the placenta and two cysts in connection with the chorion are seen.

SP. 3095A.

The amnion is still *in situ*, but several chorionic cysts are visible beneath it.

(b) Cysts in the substance of the placenta are usually filled with grumous contents, and on first sight resemble abscesses. They are commonly formed by the breaking down of an infarct, but may arise, like those of the first group, from degeneration of the trophoblast.

B. ABNORMALITIES OF THE CORD.

(1) LENGTH.—The cord may be entirely absent; it may measure only a few inches or may attain the length of six feet.

Sp. 1307A.—*A cord 63 inches long.*

(2) IRREGULAR TORSION OF THE CORD.—(a) The torsion may be greater at one part of the cord than at another (*cf.* Sp. 1307B).

(b) The spiral may be in the opposite direction to that usually found (*cf.* Sp. 1307B).

(3) KNOTS.—Knots may be formed either during pregnancy or parturition, as the result of the foetus passing through loops in the cord. When formed during pregnancy the cord is thinned by pressure atrophy at the site of the knot.

Sp. 1251 and 1307.—*Knots formed during Pregnancy.*

Sp. 3060.—*Knots formed during Parturition.*

A placenta with two cords, one tied in a knot round the other. “The second child was born dead

two hours after the birth of the first, the noose having been pulled tight by the nurse, who was ignorant of the existence of the second cord."

(4) **Loops.**—The cord may be coiled round the body or limbs of the child. In this way the available length may be so diminished as to give rise to difficulty during delivery. "Relative shortness of the cord" is the name given to this condition to distinguish it from those cases in which the cord measures only a few inches in length. To the latter group the term "absolute shortening" is applied.

SP. 1212.—*Cord coiled four times round the Neck.*

SP. 1219.—*Cord coiled round the Arm.*

SP. 1222.—*Cord coiled once round the Neck.*

(5) **IRREGULAR THICKNESS.**—The cord may vary in thickness within wide physiological limits. Pathologically it may be thin from atrophy consequent upon death of the fœtus, or thickened by myxomatous degeneration, tumours, or œdema.

Sp. 3062. *Umbilicus and Cord from a Fœtus born dead at the seventh month.*

The proximal end of the cord is contracted into a firm rod, about $\frac{1}{8}$ inch in diameter. The rest of the cord is normal.

SP. 3062A.—*Portion of an Umbilical Cord whose thickness in parts is many times that of the normal.*

The enlargement is due to the formation of cysts

filled with a gelatinous material. The process is one of myxomatous degeneration.

(6) ABNORMAL INSERTION OF THE CORD.

(a) BATTLEDORE PLACENTA.—In this condition the cord is inserted into the margin of the placenta. Sp. 1299 and 1299c.

(b) VELAMENTOUS INSERTION OF THE CORD.—In this variety the vessels separate before reaching the placenta and traverse the membranes for a variable distance. During delivery the vessels may be compressed by the presenting part or may be torn across when the membranes rupture. Death of the foetus may ensue, in the one case from asphyxia, in the other from hæmorrhage.

SP. 1299A.—*The Vessels separate 5 inches from the Placenta.*

Note that they have the same twisted arrangement on the membranes as in the cord. The membranes have ruptured close to the vessels.

SP. 1299D.—*The Cord breaks up 2 inches from the Placenta.*

V.

CHANGES IN THE UTERUS DURING PARTURITION.

CONTRACTION AND RETRACTION.

During parturition the uterus contracts and retracts. Contraction is a property of muscle by virtue of which the fibres become shorter, thicker, and tense. Contraction is followed by relaxation, the fibres returning to their original length and losing their tenseness. Retraction is a property of muscle whereby, after contraction, the fibres lose their tenseness but remain permanently shortened. Both contraction and retraction of the uterine muscle are necessary for the expulsion of the ovum.

SP. 3096.—*Retraction of the Uterus in the Third Stage of Labour.*

There is no cavity in the uterus; the walls have become shortened and thickened.

THE UPPER AND LOWER UTERINE SEGMENTS.

At the commencement of labour the diameter of the canal of the cervix and lowest part of the uterus is less than the diameter of the fœtus which is to be

expelled. It is clear, therefore, that these parts must be dilated and stretched before the child can be born. The part of the uterus which becomes thinned and stretched during labour is called the "lower uterine segment." The rest of the uterus actively contracts and becomes thicker during labour, and to it is given the name "upper uterine segment." There is no definite anatomical boundary between the two.

Dilatation of the lower segment is brought about in two ways: (1) By the contractions of the upper segment stretching open the mouth of the womb. (2) By the rise of the intra-uterine pressure, which results from a contraction, forcing the bag of membranes and the presenting part in the direction of least resistance, that is, towards the os externum. When the lower segment is sufficiently dilated the contractions of the upper segment drive the foetus through the genital canal.

THE THIRD STAGE OF LABOUR.

At the commencement of the third stage of labour the uterus has become considerably reduced in size, measuring 9 in. in length and 3 in. to $3\frac{1}{2}$ in. in breadth. The placenta occupies the whole cavity and usually lies in its long axis, a spot near its margin presenting at the os externum (*cf.* Sp. 3096).

During the third stage of labour two events occur in the uterus:

- (1) The separation of the placenta and membranes.
- (2) Their expulsion.

(1) THE SEPARATION OF THE PLACENTA.—Two

explanations of the mode of detachment of the placenta have been suggested, one by Matthews Duncan, the other by Schultze.

(a) MATTHEWS DUNCAN'S EXPLANATION.—After the expulsion of the child the placenta completely fills the cavity of the uterus; its separation is brought about by further contraction and retraction. Compared to the uterine wall the placenta is an inelastic structure, and when the area of the placental site is reduced beyond a certain limit the placenta necessarily becomes detached. The detachment commences at the margins and proceeds towards the centre.

(b) SCHULTZE'S EXPLANATION.—Schultze believed that the placenta becomes first detached near the centre, that hæmorrhage then occurs from the vessels torn through and forms a collection of blood between the uterine wall and the placenta—"the retro-placental hæmatocele." The next uterine contraction flattens out this collection and leads to still further detachment. According to this theory the detachment commences at the centre and proceeds centrifugally; the foetal surface of the placenta becomes convex, and a spot near its centre presents at the os externum. There can be no doubt that the placenta may be separated by either of these methods; probably the one described by Matthews Duncan is the commoner.

(2) THE EXPULSION OF THE PLACENTA.—The contractions of the uterus are capable of expelling the placenta into the vagina, but when this has been accomplished they can expel it no further. When delivery takes place spontaneously, it is through the

action of the abdominal muscles pressing the uterus down on to the placenta that expulsion from the vagina is effected.

SP. 3096.—*The Third Stage of Labour.*

A uterus in the third stage of labour, containing interstitial and subperitoneal fibromyomata. The child was delivered by Cæsarian section and the uterus removed on account of the degenerate condition of the fibroids. The cervix is partially dilated and the bag of membranes protrudes from it. The uterine cavity is completely filled by the placenta and membranes. The placental site is on the anterior wall and fundus uteri. It has shrunk down to half its original area without completely detaching the placenta. The portion of placental site to which it is still attached is marked by two blue glass rods; that part from which it has been separated is marked by the lower blue rod and the red rod; the lower margin of the placenta presents at the os. In this case the separation of the placenta is taking place by the method described by Matthews Duncan.

THE EFFECTS OF OBSTRUCTED LABOUR ON THE UTERUS.

(1) BANDL'S RING. If the activity of the uterus fail to expel the foetus owing to the presence of some mechanical obstruction, the contractions become more and more frequent until eventually they become continuous. The uterus is then said to be in a state of tonic contraction. As retraction advances the lower part of the uterus becomes thinned and

stretched, whilst the upper part becomes progressively thicker. Eventually there is a sharp line of demarcation between the upper and lower segments. This line is known as the retraction ring or Bandl's ring. It first appears low down on the uterus, but as the lower segment becomes elongated and the upper shortened, it gradually rises towards the fundus.

SP. 1234A.—*Bandl's Ring*.

Part of a uterus from a patient who died after the performance of Cæsarian section necessitated by a contracted pelvis. The distinction between the upper and lower uterine segments is clearly seen. The upper thickened portion measures 6 inches in length, the lower thin portion 3 inches. The wall of the upper segment varies from $\frac{3}{4}$ to 1 inch in thickness, while that of the lower segment is only $\frac{1}{4}$ inch. The shaggy appearance of the inner aspect of the upper portion is due to the presence of fragments of placenta.

(2) RUPTURE OF THE UTERUS (see "Injuries of the Genital Canal during Parturition").

THE CAUSES OF OBSTRUCTED LABOUR.

The following specimens illustrate some of the causes of obstruction to delivery :

(1) SP. 3103–3133.—CONTRACTED PELVES. For description see page 92 *et seq.*

(2) TUMOURS OF THE PELVIC BONES.

SP. 3134.—*Spondylitis Deformans.*

A pelvis with the two lower lumbar vertebræ. There is extensive lipping of the adjacent edges of the bodies of the fifth lumbar and first sacral vertebræ, leading to ankylosis. The pelvis is also generally contracted.

Rupture of the uterus occurred and the patient died undelivered.

SP. 3135.—*Sacral Exostosis.*

A pelvis with a large bony growth springing from the sacrum. The anterior part of the growth projects into and nearly fills the cavity of the pelvis.

SP. 3139.—*A Pelvis, the greater part of which is occupied by a Mass of Growth.*

The woman was delivered by embryotomy on several previous occasions. On the last occasion the uterus was ruptured during the operation and death ensued.

SP. 3140.—*Malignant Growths of the Pelvic Bones.*

A pelvis with a large mass of "medullary cancer" springing from the pubes and smaller masses from the sacrum and ilium.

(3) TUMOURS OF THE PELVIC ORGANS.

SP. 3091A.—*Fibroma of the Ovary.*

One half of a pelvis, the cavity of which is occupied by a large solid tumour of the right ovary,

which has displaced the uterus upward. The uterus and vagina, except for their position, present the appearance usually found at the end of the first week after parturition.

From a woman aged 29 who was delivered by version after craniotomy. The tumour prevented the descent of the presenting head. Death was due to septicæmia.

SP. 3090.—*Fibromyomata of the Uterus.*

A uterus containing fibromyomata, removed some days after delivery. Two pedunculated subperitoneal fibroids grow from the wall of the uterus, one from the anterior aspect near the fundus, the other lower down on the back of the organ. One of these tumours, probably the latter, obstructed delivery. Version was performed, but death ensued from sepsis.

SP. 3090A.

A uterus containing a foetus of four and a half months' gestation. Two large fibroids grow in the wall of the organ. One is situated midway between the fundus and cervix on the lateral wall, the other low down on the posterior wall.

SP. 3090B.

A uterus containing an ovum of about two months' gestation. There is a large fibroid growing from the posterior wall of the cervix.

Sp. 3090c.

A uterus containing a foetus of five months' gestation. Attached to the organ are a number of sub-peritoneal fibroids. The largest is growing from the posterior wall close to the cervix. It became impacted in the pelvis during pregnancy, and necessitated the removal of the uterus.

VI.

INJURIES OF THE GENITAL CANAL
DURING PARTURITION.

SLIGHT injuries of the genital canal occur in all first labours, and must be regarded as inevitable. The hymen is most frequently torn during coitus. Such tears do not usually reach the attached margin of the membrane, but appear as notches in the free border. In parturition the hymen is torn down to its insertion at several points, and when healing is completed the remains form a row of fleshy tags round the vaginal orifice—the *carunculæ myrtiformes*. Slight tears of the fourchette and of the cervix may also be regarded as inevitable. Not uncommonly other and severer injuries are inflicted. They may involve the vagina, cervix, or body of the uterus. Such injuries are due to a variety of causes :

(a) Precipitate labour. When no disproportion exists between the size of the child and the maternal passages, the contractions of the uterus may be so violent as to drive the child through the genital canal before it has become sufficiently dilated.

(b) Disproportion between the size of the foetus

and the genital canal. (1) The foetus may be unusually well developed, or its size may be increased by such diseases as hydrocephaly, ascites, or cystic kidneys. (2) The maternal passages may be unusually small.

(c) Abnormal rigidity of the genital canal may result from advancing age, from the presence of scar-tissue, or from a malignant growth.

(d) The unskilful use of instruments or the removal of pieces of bone after the operation of craniotomy.

Tears may be either vertical or transverse. Vertical tears usually result from over-distension of the genital canal; transverse tears from excessive stretching in its long axis, as in obstructed labour.

VERTICAL TEARS.

(1) The perinaeum. We recognise :

(a) Antero-posterior tears extending backwards towards the coccyx. They vary in length from a slight laceration of the fourchette such as occurs in all first labours to a tear extending into the rectum. Those not involving the sphincter ani are called "incomplete," those extending into the rectum, "complete."

SP. 3086.—*Incomplete Tear.*

The external genitalia showing a tear extending through the fourchette nearly to the muco-cutaneous margin of the anus. The sphincter ani is not involved.

LATERAL TEARS.

These are less common. They may involve either or both sides of the perinæum.

CENTRAL TEARS.

Two varieties of injury are included under this term :

(a) Tears caused by the birth of the foetus, not through the vulva, but through a laceration in the perinæum between the fourchette and the anal margin. In these cases a bridge of tissue is left between the posterior margin of the vulva and the central tear.

(b) Tears in which the skin and the vaginal mucosa remain intact, but the fibro-muscular tissue of the perinæal body is torn through.

TEARS OF THE VAGINA.

Tears of the vagina alone may occur—(a) in elderly primiparæ, (b) from the unskilful use of instruments, (c) in malignant disease of the vaginal walls. Tears due to the delivery of an abnormally large child are usually associated with injuries to the perinæum and cervix.

SP. 3084.—*Tear of the Vagina and Cervix.*

A uterus and vagina with a portion of the rectum. A curved rent $2\frac{1}{2}$ inches long involves the lower part of the cervix and upper part of the vaginal wall. The tear has extended into and laid open the pouch of Douglas. A band of lymph passes from the margin of the tear to the anterior

aspect of the rectum. Although the injury was inflicted six weeks before death there is very little evidence of repair.

From a woman who had previously been delivered of two stillborn children, one by the use of forceps, one by the crochet. Fifteen hours after the commencement of the third labour she complained of a sense of suffocation, her pulse-rate rose to 140 per minute, there was an escape of blood from the vagina, and the labour pains gradually ceased. She was delivered by craniotomy, and after delivery the laceration of the vagina was discovered. It is stated that the pelvis was small in the antero-posterior diameter. The patient died of peritonitis six weeks later.

TEARS OF THE CERVIX.

These are so common that few women escape them. They may be unilateral or bilateral. The injuries are usually inflicted by the occiput, the hardest part of the head; and since the occiput most often lies to the left, unilateral tears are commoner on the left than on the right side.

SP. 1237A.—*Cervical Laceration.*

The cervix and upper part of the vagina from a patient who died seven days after delivery. The cervical canal has the form of a transverse slit, and the lips of the cervix show numerous slight lacerations. At either lateral extremity is a deeper tear extending almost to the vaginal reflection.

TEARS OF THE LOWER UTERINE SEGMENT.

Such lacerations are commonly extensions of tears commencing in the cervix. They may occur (1) spontaneously, (2) as the result of attempts at delivery. When spontaneous they are most often associated with the presence of placenta prævia, the implantation of the placenta on the lower uterine segment rendering the tissues unusually friable. They may also occur in cases of precipitate labour when the fœtus is expelled before full dilatation of the cervix, in cases of abnormally large children or in carcinoma of the cervix. When artificially produced, they usually result either from attempts at version or attempts to drag the child through an imperfectly dilated cervix.

These injuries are attended by grave dangers. Large branches of the uterine artery may be torn through, leading to death from hæmorrhage; or the peritoneal cavity may be opened and septic peritonitis result.

Two varieties of rupture of the lower uterine segment are recognised, according as the peritoneal cavity is opened or not. In "complete ruptures" the peritoneal coat is torn through, and hæmorrhage occurs into the abdominal cavity. In "incomplete rupture" the peritoneum escapes, the tear extending only through the fibro-muscular wall of the uterus. In such cases the blood usually collects between the two layers of the broad ligament.

SP. 3082A.—*Complete Rupture.*

The uterus, vagina and rectum from a patient who

died of complete rupture of the lower uterine segment during parturition. The cervix and upper part of the vagina are extensively infiltrated with squamous-celled carcinoma. The diseased tissues gave way during delivery, the laceration involving the posterior wall of the vagina, cervix and lower uterine segment. The tear has extended into the pouch of Douglas.

From a woman aged 29, who had previously borne eight children. After a rapid labour a full-term child was born naturally. Half an hour later the patient became collapsed, and within an hour was dead. The carcinoma was unsuspected before delivery.

SP. 3081A.—*Incomplete Rupture of the Uterus.*

A coronal section of the uterus at full term showing a rupture into the left broad ligament. The section of the uterine wall shows on the left side a very marked thickening of the upper segment and a clear line of demarcation between this and the lower segment. This retraction ring can be traced half-way across the uterine cavity, but is lost on the right side. Immediately below it on the left side the thin lower segment has ruptured, and effusion of blood has taken place into the left broad ligament. A coil of colon partially surrounded by clot is adherent to the ligament.

The patient, a woman aged 38, had previously borne six children. The child was expelled spontaneously half an hour after the onset of labour. After the birth of the child the mother became

collapsed, pulseless, and died within half an hour. There was no external hæmorrhage.

TRANSVERSE TEARS.

Transverse tears of the uterus and vagina occur as the result of obstructed labour. The commonest causes of obstruction are (a) contracted pelvis, (b) transverse lie, (c) foetal deformities. If the obstruction be so great that spontaneous expulsion of the child is impossible, the uterus passes into a state of tonic contraction and the lower uterine segment becomes markedly thinned and stretched. If neglected the case may terminate in one of two ways: first, the patient may die from what is called "exhaustion," but is in reality a condition of acute septic infection; secondly, the genital canal may rupture and the foetus possibly escape through the rent into the peritoneal cavity. Such a tear is usually transverse. Whether the rupture involves the uterus or vagina depends upon the kind of obstruction; if the cervix be pinned down between the brim of the pelvis and the presenting part, the rupture will involve the lower uterine segment; if the cervix and the upper part of the vagina be drawn up over the presenting part, the vagina usually gives way.

SP. 3081.—*Transverse Tear of the Uterus.*

A uterus ruptured during labour with a hydrocephalic foetus. The tear is in the main transverse, and involves two thirds of the circumference of the lower uterine segment. On the posterior aspect it

extends almost as high as the attachment of the right ovarian ligament and involves the placental site. The skeleton of the foetus is preserved in the museum. (See also Sp. 3489, in case on ground floor.)

SP. 3082.—*Rupture of the Vagina.*

The pelvic viscera from a woman who died three days after delivery. A large transverse rent is seen in the posterior wall of the vagina near its attachment to the uterus.

From a woman, aged 38, who had “acute curvature of the spine.” She had previously borne two children, both delivered with forceps. Her third labour commenced at 3 p.m. At 11 p.m. the pains became very severe, continued so for a short time, and then ceased entirely. The patient became collapsed, and on examination the child and the uterus could be felt as two distinct tumours in the abdomen. The pelvic measurements are not recorded.

SP. 3083.—*Rupture of the Uterus.*

A uterus shortly after parturition showing a transverse tear at the junction of the upper and lower uterine segments. The uterus, which measures 8 inches in length, has been laid open on its anterior aspect to show the marked change in thickness in its wall in the upper and lower uterine segments. At the junction of the two segments is Bandl’s ring. The upper segment is thick and contracted, the

lower thin and stretched. The tear involves the anterior half of the uterus immediately below the site of Bandl's ring.

SLOUGHING OF THE GENITAL CANAL AFTER LABOUR.

When the head is tightly impacted at the brim or in the cavity of the pelvis, the soft parts of the genital canal are compressed between the child's head and the pelvic bones. As the result of compression the blood supply is interfered with, and if the pressure is sufficiently long maintained the soft parts perish and are eventually cast off as a slough. The whole circumference of the canal may be compressed, as in the small round pelvis, or the pressure may be localised as in flat pelvis, where it is exerted opposite the promontory of the sacrum and the symphysis pubis. When the slough separates fistulous communications may be established between the uterus or vagina and the neighbouring viscera, the bladder, rectum, or coils of intestine.

Sr. 3087.—*Sloughing of the whole Circumference of the Vagina.*

The pelvic viscera and external organs of generation from a woman who died with extensive sloughing, the result of a long and difficult labour. From prolonged pressure between the head of the child and the brim of the pelvis a slough involving the whole circumference has been formed in the lower uterine segment, and has completely detached the vagina and cervix from the upper part of the uterus.

The rounded, irregular margin and the tags of necrotic tissue seen at the line of separation indicate the nature of the process.

SP. 3088.—*Vesico-Vaginal Fistula.*

A bladder, uterus and vagina showing a large fistulous communication between the bladder and vagina. A bristle has been placed in the orifice of each ureter and a glass rod in the urethra. The fistula was formed as the result of injuries received during parturition.

SP. 3089.—*A larger Vesico-vaginal Fistula.*

A glass rod has been placed in the urethra, and the anterior vaginal wall has been dissected off the bladder and turned downwards.

VII.

SEQUELÆ OF LABOUR AND ABORTION.

(1) RETAINED PRODUCTS OF CONCEPTION.

After either abortion or delivery at term the placenta and membranes or portions of them may be retained in the uterus.

Retention of the placenta is most frequent after abortion during the third and fourth months of gestation, for at this time it is most intimately attached to the uterine wall.

At term the placenta is retained when either (1) the expulsive mechanism is at fault or (2) the attachment is firmer than usual.

Retention of portions of the placenta is often caused by hurrying the third stage of labour, as for instance by the injudicious use of Crede's method of expulsion; more rarely the force of the uterine contractions is insufficient to bring about its complete detachment.

Morbid adhesion of the whole placenta is rare. In such cases microscopic sections of the placenta and its site reveal the cause. The decidua basalis is thin, and the spongy layer, through which separation usually occurs, is absent. The chorionic villi penetrate through the thin decidua and are embedded in the uterine muscle. Partial morbid adhesion is

commoner and is often due to the presence of a placental infarct.

HOURLASS CONTRACTION OF THE UTERUS.

With an abnormally adherent, and sometimes with a normal placenta, the organ may be retained by an irregular contraction of the uterine muscle. A ring of contraction resembling Bandl's ring, though possibly of different origin, constricts the uterus at one spot, whilst the uterine walls above and below are relaxed. The placenta is retained above the contraction ring in the upper segment. The shape of the uterus bears some resemblance to that of an hour-glass.

Placentæ succenturiatæ may be retained after expulsion of the main placenta and membranes.

PLACENTAL POLYPUS.

At first the retained portion of placenta has the appearance of normal placental tissue, but subsequently becomes infiltrated with blood, whilst its surface is covered with layer after layer of blood-clot. The resulting mass is known as a "fibrinous or placental polypus." On section such a polypus consists of laminated clot, and often the original nucleus of placental tissue cannot be discovered, for the changes undergone render it indistinguishable from the enveloping clot. On microscopic examination the placental origin of the mass can be proved by the demonstration of chorionic villi.

SP. 3093.—*Retained Placenta.*

A section of a uterus shortly after delivery with

the placenta *in situ*. Detachment has commenced at the lower part, but the remainder is still attached to the uterine wall.

SP. 3093A.—*Half a Uterus removed from a patient who died three days after delivery.*

A considerable mass of placenta is attached to uterine wall. The cut surface presents the usual appearance of placental tissue.

SP. 3094A.—*Placental Polypus.*

The uterus of a woman who died of pyæmia four weeks after delivery. A portion of placenta is attached to the uterine wall near the fundus. It is covered with blood-clot, and hanging from the lower end is an elongated mass apparently also composed of clot.

SP. 3095.—*The Uterus from a woman who died after a miscarriage at the fifth month.*

A rounded pedunculated mass of placenta about $\frac{3}{4}$ inch in diameter is attached to the inner wall of the uterus. The mass is covered with fibrin.

(2) THROMBOSIS OF VEINS.

Venous thrombosis following delivery is usually the result of septic infection and is particularly prone to follow severe ante- or post-partum hæmorrhage.

The veins usually involved are the left uterine, iliac and femoral, but those of the right side may be affected alone or in combination with those of the

left. (For pelvic thrombosis *cf.* “Pelvic Inflammation.”) The leg on the affected side swells and becomes œdematous and painful especially over the course of the larger veins and at the points of communication between the deep and superficial veins, *e.g.* the saphenous opening and the popliteal space. At first the leg pits on pressure and the vein can be palpated as a tender cord. Later, when the lymphatics are obstructed, the skin is smooth, tightly stretched, and marked like marble by purplish streaks outlining the inflamed veins; at this stage pitting on pressure can no longer be obtained. The condition is known as “white leg, or phlegmasia alba dolens.”

Sp. 1578A.—*Thrombosis of Veins.*

A right iliac vein laid open to display a clot. The clot is for the most part firm but in places is breaking down.

“From a woman who had phlegmasia alba dolens and died four weeks after delivery.”

For the uterus from the above case see Sp. 3094A.

PULMONARY EMBOLISM.

Pulmonary embolism may occur after labour apparently normal, but is more especially associated with parametritis and phlegmasia alba dolens. The clot is carried by the venous blood-stream to the heart and thence to the lungs, where it is arrested in one of the branches of the pulmonary artery. According to the size of the vessel obstructed a larger or smaller area of the lung is deprived of its blood supply. In septic cases embolism is commonest at

from four to six weeks after delivery. The embolus is usually part of a clot blocking a large vein and is separated as the result of softening of portions of the clot. The date of detachment depends on the time taken by the softening process. Although the clot originates as the result of septic infection, it does not necessarily lead to infection of the lung. If it does and if the patient survive the initial disturbance due to the lodging of the embolus, abscess of the lung and pyæmia may supervene.

SP. 1564A.—*Pulmonary Embolism.*

A heart and pulmonary artery with its main branches showing an embolus. In the right ventricle at the commencement of the conus arteriosus is a firm clot, attached to the endocardium. Immediately above the pulmonary valves and extending into the right pulmonary artery and its branches is a large clot which fills the lumen of the vessels. On the cut surface of the lung many of the arterial branches are filled with clot. The lung tissue is engorged with blood.

The patient had suffered from symptoms of septic infection for a month after delivery, and was leaving the hospital apparently convalescent when she dropped down dead.

Post-mortem the right common and internal iliac veins contained firm clot. There was a loose clot in the inferior vena cava and the right ovarian vein was distended with pus.

SP. 1709B.—*Infective Infarct (not puerperal)*.

In the left lower lobe close to the base is a cavity containing dirty, greenish pus. In this cavity is a sequestrum of lung-tissue which nearly fills it. The abscess cavity is lined by a thick wall.

VIII.

CONTRACTED PELVIS.

A PELVIS is said to be contracted when it is so shortened in one or more of its diameters as to interfere with the normal mechanism of delivery. In cases of contracted pelvis it is of great importance to ascertain the measurements of the pelvic strait,* but most of these cannot be taken on the living woman.

It is, however, possible to take certain external measurements from which an inference can be drawn as to the type and to some extent the degree of deformity under investigation. The measurements of the abnormal pelvis to be studied should be compared with the average measurements of the normal pelvis given in the following list :

(1) EXTERNAL MEASUREMENTS.	Inches.
(a) Interspinous. The distance between the anterior superior iliac spines	10
(b) Intercristal. The maximum distance be- tween the iliac crests	$11\frac{1}{4}$
(c) Posterior interspinous. The distance be- tween the posterior superior iliac spines	$3\frac{1}{2}$
(approximately $\frac{1}{3}$ that of the interspinous)	

* The term "pelvic strait" is used to indicate that portion of the pelvis traversed by the child during its birth. The term "superior strait" is applied to the pelvic inlet, and the term "inferior strait" to the pelvic outlet.

Inches.

- (d) External conjugate or diameter of Beau-
delocque, measured from the depression
below the last lumbar spine to the top
of the symphysis pubis $7\frac{1}{2}$

This measurement is approximately $3\frac{1}{2}$ inches greater than the true conjugate. It includes not only the pelvic bones but also the soft parts covering them.

(2) MEASUREMENTS OF THE PELVIC STRAIT.

(a) INLET.

Inches.

- (1) Anterior-posterior (or conjugate) diameter
measured from the promontory of the
sacrum to the nearest point on the
posterior aspect of the symphysis pubis $4\frac{1}{4}$
- (2) Transverse diameter measured at the
point of widest separation of the iliac
bones $5\frac{1}{4}$
- (3) Oblique diameter measured from the
sacro-iliac synchondrosis to the ilio-
pectineal eminence of the opposite side $4\frac{3}{4}$

(b) CAVITY.

- (1) Antero-posterior, measured from the
junction of the second and third pieces
of the sacrum to the centre of the
posterior surface of the symphysis pubis $4\frac{3}{4}$
- (2) The transverse and oblique measure-
ments are approximately $4\frac{3}{4}$ inches, but
are not taken from fixed anatomical
points.

	Inches.
(3) Internal interspinous, the distance between the spines of the ischia . . .	4

(c) OUTLET.

(1) Antero - posterior, measured from the lower end of the sacrum to the lower border of the symphysis pubis . . .	$5\frac{1}{4}$
(2) Transverse, measured from the centre of the inner border of the ischial tuberosities	$4\frac{1}{4}$

(d) DIAGONAL CONJUGATE, measured from the promontory of the sacrum to the lower border of the symphysis pubis . . .	$4\frac{3}{4}$
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N.B.—This measurement is approximately $\frac{1}{2}$ inch greater than the antero-posterior of the inlet, the true conjugate.

VARIETIES OF CONTRACTED PELTS.

Three varieties of contracted pelvis are common in midwifery practice, but other forms are rare. The common varieties are :

- (1) The simple flat pelvis ;
- (2) The small round pelvis ;
- (3) The rickety pelvis.

(1) THE SIMPLE FLAT PELVIS.

The deformity is mainly due to the forward and downward displacement of the sacrum. The promontory lies lower in the pelvis than usual and thus leads to a diminution of the antero-posterior diameter of the inlet, and to a less extent of the cavity

and outlet also. The transverse diameter is of normal size or may be slightly increased. The following anatomical peculiarities are found in addition :

(1) The anterior superior iliac spines are usually further apart than the normal. The distance between them may be as great as or greater than that between the crests. This lack of proportion is due to the fact that the ilia are less incurved than usual. In some cases (see Sp. 3105) the iliac bones are small and ill-developed.

(2) The posterior superior iliac spines are nearer together than usual.

(3) The spines of the sacral vertebræ are depressed below the level of the line joining the posterior superior iliac spines.

(4) The articulation between the first and second sacral vertebræ is sometimes more prominent than usual, and constitutes what is known as a second or false promontory (see Sp. 3106).

SP. 3105.—*A Flat Pelvis with a true conjugate of $3\frac{1}{2}$ inches.*

Note in the specimen :

(1) The diminution of the true conjugate and of the antero-posterior diameter of the outlet.

(2) The ill-development of the iliac bones.

(3) The posterior superior iliac spines are nearer together than the normal.

(4) The spines of the sacral vertebræ are sunk below the level of the line joining the posterior superior iliac spines. (For measurements see table given below.)

SP. 3103.—*A Flat Pelvis with a true conjugate of $3\frac{1}{4}$ inches.*

Note in addition to the contraction of the conjugate the following points :

(1) That the sacrum is sunk low in the pelvis.

(2) That the transverse diameter of the brim is greater than in the normal pelvis, viz. $5\frac{3}{4}$ inches.

(3) The level of the sacral spines is sunk below that of the line joining the posterior superior iliac spines.

SP. 3111.—*A Flat Pelvis with a true conjugate of 3 inches.*

In some respects this pelvis differs from the usual type of flat pelvis. The promontory of the sacrum is above the general level of the pelvic brim but projects forwards in a marked manner, narrowing the conjugate. The distance between the posterior superior iliac spines is $2\frac{1}{2}$ inches. The iliac bones are ill-developed and the iliac fossæ are unusually deep. It is possible that rickets was the cause of the deformity in this case.

The measurements of these specimens are as follows :

<i>External :</i>	Sp. 3105. Sp. 3103. Sp. 3111.		
	Inches.	Inches.	Inches.
Interspinous . . .	10	$10\frac{3}{4}$	$9\frac{1}{4}$
Intercristal . . .	11	$11\frac{1}{2}$	11
Posterior interspinous	3	4	$2\frac{1}{2}$

<i>Pelvic Strait : Brim.</i>		Sp. 3105. Inches.	Sp. 3103. Inches.	Sp. 3111. Inches.
Conjugate	.	$3\frac{1}{2}$	$3\frac{1}{4}$	3
Transverse	.	5	$5\frac{3}{4}$	5
Oblique	.	$4\frac{3}{4}$	5	5
<i>Cavity.</i>				
Between ischial spines		$4\frac{1}{4}$	5	$3\frac{3}{4}$
<i>Outlet.</i>				
Transverse	.	$4\frac{1}{2}$	5	$4\frac{3}{4}$
Antero-posterior	.	$3\frac{1}{2}$	$4\frac{1}{2}$	5

(2) THE SMALL ROUND PELVIS.

The small round pelvis is characterised by a smallness of all the bones comprising it, the result of a congenital defect. There is a diminution in all the diameters, but all are not diminished in the same proportion, hence the term “pelvis æquabiliter justo minor” cannot be accurately applied to this variety. The diameters most affected are the transverse of the brim and all those of the outlet. Though produced mainly by the smallness of the bones, the contraction is due in part to the position of the sacrum. This bone is situated high up so that the promontory lies above the general level of the pelvic brim, and is so rotated on its transverse axis that its lower end encroaches upon and diminishes the antero-posterior diameter of the outlet. As the result of the high position of the sacrum the posterior superior iliac spines are further apart and the ischial tuberosities nearer

together than the normal. The pelvic inlet is nearly round, and the conjugate diameter, though absolutely diminished, is relatively greater than the transverse. The other anatomical peculiarities to be observed are:

(1) The crests of the ilia are more incurved, consequently the anterior superior iliac spines are relatively nearer together than the crests.

(2) The spines of the sacral vertebræ are raised above the level of the line joining the posterior superior iliac spines.

(3) The spines of the ischia project further into the pelvic cavity than the normal.

SP. 3104A.—*A Small Round Pelvis.*

Note—(1) The bones comprising the pelvis are small.

(2) The promontory of the sacrum lies above the level of the pelvic brim.

(3) The sacrum is rotated backwards so that its lower end encroaches upon the antero-posterior diameter of the outlet.

(4) The proportion of the distance between the posterior superior iliac spines to that between the anterior superior iliac spines is $1 : 3\frac{1}{2}$ instead of $1 : 3$.

(5) The ischial tuberosities are closer together than usual.

(6) The pelvic inlet is nearly round, and the conjugate diameter is greater than the transverse.

Sp. 3108 and 3109 are other specimens of generally contracted pelvis.

	Sp. 3104A.	Sp. 3108.	Sp. 3109.
<i>External :</i>	Inches.	Inches.	Inches.
Interspinous . . .	$7\frac{3}{4}$	$8\frac{1}{2}$	$7\frac{1}{2}$
Intercristal . . .	$8\frac{1}{4}$	10	9
Posterior interspinous	$2\frac{1}{2}$	3	$2\frac{1}{2}$
<i>Internal : Brim.</i>			
Conjugate . . .	$4\frac{1}{4}$	$3\frac{1}{4}$	$3\frac{1}{2}$
Transverse . . .	4	$4\frac{1}{2}$	$4\frac{1}{4}$
Oblique . . .	4	$4\frac{1}{4}$	4
<i>Cavity.</i>			
Ischial spines . . .	3	$3\frac{3}{4}$	$3\frac{1}{4}$
<i>Outlet.</i>			
Antero-posterior . . .	4	4	$3\frac{3}{4}$
Transverse . . .	$3\frac{1}{2}$	4	$3\frac{1}{2}$

(3) THE RICKETY PELVIS.

The rickety pelvis may be simply flat, or flat and generally contracted. Flattening is due to the compression of the pelvic girdle, softened by rickets, between the downward thrust of the vertebral column and the upward thrust of the femora. If in addition the growth of the bones is stunted by the disease, the pelvis will be small in all its measurements as well as flat.

Besides the diminution of the antero-posterior diameter of the brim other evidence of rickets is present. The bones are light and small. The pelvis is short from above downwards. The iliac crests are short and flared out so that the inter-

spinous measurement approaches and may even exceed the intercrystal. The posterior superior spines are closer together than usual. The iliac fossæ look more forwards and upwards. The sacrum is rotated round a transverse axis, so that the promontory moves forwards while the lower end moves backwards and upwards. The vertical concavity of the sacrum is reduced so that it may be almost straight throughout, or curved only at its lower end. Since the body-weight is transmitted chiefly through the bodies of the sacral vertebræ, these are thrust forwards in front of the lateral masses, rendering the sacrum convex from side to side. The lateral masses are small and the epiphysial lines abnormally prominent. The pubic arch is wide, and the rami of the pubes and ischia everted, whilst the acetabula look more directly forwards than the normal.

SP. 3129A.—*A Rickety, Small Flat Pelvis.*

Note.—(1) The diminution of the conjugate.

(2) The smallness and lightness of the bones comprising the pelvis, particularly the pubes and ischia.

(3) The shortness and flaring of the iliac crests.

(4) The sacrum is straight from above downwards, convex from side to side, and rotated round a transverse axis. The lateral masses are small and the epiphysial lines prominent.

(5) The pubic arch is wide, and the rami of the pubes and ischia everted.

(6) The acetabula look more directly forwards than the normal.

<i>External :</i>					Inches.
Interspinous	.	.	.	.	10
Intercristal	.	.	.	.	10
Posterior interspinous	.	.	.	.	$2\frac{1}{2}$
<i>Internal : Brim.</i>					
Conjugate	.	.	.	.	2
Transverse	.	.	.	.	5
Oblique	.	.	.	.	$4\frac{1}{4}$
<i>Cavity.</i>					
Ischial spines	.	.	.	.	$4\frac{1}{4}$
<i>Outlet.</i>					
Antero-posterior	.	.	.	.	$4\frac{1}{4}$
Transverse	.	.	.	.	$4\frac{1}{2}$

SP. 3118.—*A Rickety Pelvis with Extreme Deformity.*

Note—(1) The pelvis is asymmetrical.

(2) The vertical measurement is diminished.

(3) The ilia are very small.

(4) The pubic arch is wide.

<i>External :</i>					Inches.
Interspinous	.	.	.	.	$9\frac{3}{4}$
Intercristal	.	.	.	.	$9\frac{3}{4}$
Posterior interspinous	.	.	.	.	2
<i>Internal : Brim.</i>					
Conjugate	.	.	.	.	$\frac{3}{4}$
Transverse	.	.	.	.	5
Oblique	.	.	.	.	$4\frac{1}{2}$

<i>Cavity.</i>	Inches.
Ischial spines	4½
<i>Outlet.</i>	
Antero-posterior	3
Transverse	5
See also Spp. 272, 276, 277, 278, 279.	

RARE VARIETIES.

(1) THE NAEGELE PELVIS.

The deformity in this type is due to congenital absence of one lateral mass of the sacrum. The body of the sacrum is usually but not invariably ankylosed to the ilium. The ilium on the affected side is carried over towards the opposite side of the pelvis, and the symphysis pubis, instead of lying in the middle line, lies nearly opposite the sacro-iliac synchondrosis of the sound side. On the affected side the iliac fossa is short from before backwards, sharply curved and directed more inwards than usual, while the curve of the horizontal ramus of the pubes is straightened out. On the opposite side the changes are the reverse of these; the iliac fossa is open and looks forward, and there is a sharp curve at the junction of the horizontal ramus and the body of the pubes. The effect of the deformity is to diminish greatly the cavity of the affected side of the pelvis without increasing to any appreciable extent that of the sound side. The important measurement from an obstetric point of view is one taken from the sacro-iliac synchondrosis of the sound

side to a point above the obturator foramen of the affected side.

SP. 3125.—*A Naegele Pelvis.*

The right lateral mass of the sacrum is absent and the sacrum is ankylosed to the ilium.

SP. 3126A.—*A Similar Specimen.*

The sacrum is ankylosed to the ilium in front, but behind a division between the bones can be seen.

(2) THE ROBERT PELVIS.

The deformity is due to the absence of the lateral masses of the sacrum on both sides. The pelvis is therefore contracted transversely but is symmetrical. The sacrum is ankylosed to the ilia.

SP. 3124.—*A Robert Pelvis.*

Note the narrow sacrum with no lateral masses, and the resulting transverse contraction.

(3) THE FUNNEL-SHAPED PELVIS.

A funnel-shaped pelvis is one in which the measurements of the outlet are proportionately less than those of the inlet. The small round and the kyphotic pelves have this peculiarity, but the type to which the name is given is contracted only at the outlet, and its deformity is not secondary to changes in the spine or elsewhere.

SP. 3123.—*A Funnel-shaped Pelvis.*

Note that the outlet is small while the inlet is large, and further that the iliac fossæ meet the brim of the pelvis at a less acute angle than usual.

<i>Inlet:</i>					Inches.
Conjugate.	.	.	.	.	$4\frac{3}{4}$
Transverse	.	.	.	.	$5\frac{1}{2}$
Oblique	.	.	.	.	$5\frac{1}{4}$

<i>Outlet:</i>					
Antero-posterior	.	.	.	.	$3\frac{1}{2}$
Transverse	.	.	.	.	$3\frac{3}{4}$

(4) THE KYPHOTIC PELVIS.

In cases of kyphosis affecting the lower part of the vertebral column, the compensatory changes which enable the patient to assume a comparatively erect position affect the pelvis. The whole pelvis is rotated backwards, so that the plane of the brim is less inclined to the horizon and the lumbo-sacral curve is straightened out. This backward rotation affects the sacrum more than the rest of the pelvis, and eventually the promontory lies higher up and further back than usual, while the lower end approaches the symphysis pubis. The shape of the sacrum is altered and is more concave from side to side, whilst the sacral spines are raised above the level of the posterior part of the iliac crests. The backward rotation of the pelvis is resisted by the ilio-femoral ligaments, strong bands of fascia stretching from the inter-trochanteric line of the femur to the anterior inferior spine of the ilium. A force

tending to rotate the pelvis backwards is thus applied to the posterior ends of the innominate bones, and one tending to rotate the pelvis forwards at the anterior ends of these bones. By the action of these two opposing forces the shape of the bones is altered, so that the ilio-pectineal line is less curved than usual. At the same time the whole iliac bone is rotated about an antero-posterior axis so that the ischial tuberosities are rotated inwards and the iliac crests outwards, thus causing the pelvis to become funnel-shaped.

The measurements of the inlet are increased, particularly that of the conjugate; those of the outlet are diminished. It will be noted that these changes are the reverse of those which occur in rickets. In rickets, owing to the softness of the bones the anterior and posterior walls of the pelvic brim are pushed together; in the kyphotic pelvis they are dragged apart.

SP. 1112.—*A Spine and Pelvis* (in case on the ground floor).

The spine presents an acute angular curvature in its dorsal region, the result of tuberculous disease of the bodies of the last nine dorsal and first lumbar vertebræ. The changes due to kyphosis are unusually well marked considering the distance of the site of the disease from the sacrum.

Note the diminished curvature of the ilio-pectineal lines and the funnel shape of the pelvis due to the wide inlet and narrow outlet.

<i>External :</i>	Inches.
Interspinous	$9\frac{3}{4}$
Intercristal	$10\frac{3}{4}$
Posterior interspinous	$3\frac{1}{4}$

Internal : Brim.

Conjugate	$4\frac{1}{2}$
Transverse	$5\frac{1}{4}$
Oblique	$4\frac{3}{4}$

Cavity.

Ischial spines	3
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Outlet.

Antero-posterior	$3\frac{1}{2}$
Transverse	$3\frac{1}{2}$

SP. 1113.—*A Spine and Pelvis showing Angular Curvature in the Lumbar Region.*

The pelvis shows the changes due to kyphosis, but the anterior surface of the sacrum is for the most part destroyed by extension of the disease from the lumbar vertebræ.

SP. 1122.—*A Spine and Pelvis.*

The spine presents a lateral curvature with kyphosis. The pelvis shows the appearances resulting from this condition.

<i>External :</i>	Inches.
Interspinous	$8\frac{3}{4}$
Intercristal	$10\frac{1}{2}$
Posterior interspinous	4

<i>Internal : Brim.</i>					Inches.
Conjugate	.	.	.	.	5
Transverse	.	.	.	.	$5\frac{1}{4}$
Oblique	.	.	.	.	5
<i>Cavity.</i>					
Ischial spines	.	.	.	.	4
<i>Outlet.</i>					
Antero-posterior	.	.	.	.	$3\frac{3}{4}$
Transverse	.	.	.	.	$4\frac{1}{4}$

(5) THE SPONDYLO-LISTHETIC PELVIS.

In this type of pelvis the body of the last lumbar vertebra slips forwards on the sacrum and so lies nearer to the symphysis pubis. It is produced as follows: In cases of imperfect ossification of the bone constituting the lateral portions of the neural arch, between the upper and lower articular processes of the fifth lumbar vertebra, a strain may cause the weak spot to give way, and allow the body of the vertebra, together with the whole of the spine above it, to slip forwards on the sacrum. It is stated that spondylo-listhesis may result from fracture of the articular processes of the sacrum, or of the interarticular portion of the fifth lumbar vertebra, but this is doubtful.

The following changes result from the displacement:

(i) IN THE FIFTH LUMBAR VERTEBRA.—The neural canal is increased in the sagittal diameter. The body becomes wedge-shaped, with the base of the wedge in front.

New bone fills up the angle between the lower surface of the body and the front of the sacrum.

(ii) IN THE SACRUM.—The thrust of the superimposed skeleton is directed against the front instead of the upper surface of the sacrum, and so rotates the upper end of the bone backwards and the lower end forwards towards the symphysis. The posterior superior iliac spines are thus separated more widely than usual.

(iii) IN THE OSSA INNOMINATA.—These bones are so rotated that the distance between their crests is increased while that between the tubera ischiorum is diminished.

(iv) IN THE SPINE.—The natural forward curve of the lumbar portion is much accentuated.

It will be noticed that the changes in the sacrum and ossa innominata resemble those observed in the kyphotic pelvis, but in spondylo-listhesis the sacrum is pushed backwards instead of pulled backwards; and further, the projection forwards of the spine encroaches upon the pelvic inlet whilst the true conjugate is increased.

(6) SPONDYLOLIZEMA.

Owing to destruction of the body of the fifth lumbar vertebra by tuberculous disease the lumbar spine meets the sacrum at an acute angle. The angle may be so acute that the superjacent spine roofs over the pelvic inlet. The name "pelvis obtecta" is given to this condition.

SP. 3130.—*A Spondylo-listhetic Pelvis.*

Note especially the covering in of the pelvic inlet by the lumbar spine, while the true conjugate is not reduced; note also the diminution of the outlet caused by the rotation forwards of the lower end of the sacrum.

	Inches.
Interspinous	9
Intercristal	$10\frac{1}{4}$
Posterior interspinous	4
<i>Inlet.</i>	
True conjugate	4
(available space)	$2\frac{3}{4}$
Transverse	5
Oblique	Rt. $4\frac{3}{4}$, Lt. $4\frac{1}{2}$

Cavity.

Ischial spines	$4\frac{1}{4}$
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Outlet.

Antero-posterior	$3\frac{3}{4}$
Transverse	$4\frac{1}{2}$

(7) THE TRIRADIATE PELVIS.

In the disease known as osteomalacia or mollities ossium, and sometimes in rickets, an extreme degree of softening of the bones occurs, leading to a deformity, to which the name “triradiate” or “beaked pelvis” is given. It is produced as follows: The upward thrust of the femora not only flattens the pelvis, but forces inwards the antero-lateral portion of the pelvic girdle on either side of the os

pubis, until it becomes convex towards the cavity. As a result of these changes the inlet is Y-shaped. One limb extends forwards between the pubic rami of opposite sides, and two extend backwards, one on either side of the sacrum. The os pubis projects forwards like a beak, and the pubic arch is very narrow. The iliac fossæ are deep. The crests of the ilia and tuberosities of the ischia may be everted by the traction of the muscles attached to them or crushed in towards the cavity of the pelvis by the body weight.

The sacrum is situated low down between the ossa innominata, close to the back of the symphysis pubis, and its lower end is curved forwards and closes the posterior part of the pelvic outlet.

Owing to the excessive pliability of the bones the deformity is often asymmetrical, and in extreme cases the sides of the pelvis are crushed in to such an extent that they almost meet and close up the cavity.

The rickety and osteo-malacic triradiate pelves may be distinguished from one another by the different effects of the two diseases upon the bones. The features characteristic of rickets have already been described. In osteo-malacia the bones are not reduced in size or bulk, but are extremely light. The Haversian canals are large, so that the compact bone appears porous, and the trabeculæ of the cancellous parts are finer and less numerous than in any other disease. During life the bones may be so soft that they can be bent by the fingers.

SP. 291.—*A Triradiate Pelvis.*

The pelvis is that of a woman the subject of osteo-malacia.

Note—(1) The bones are light and porous.

(2) The superior strait is triradiate.

(3) The inferior strait is narrowed by the proximity of the rami of the pubes and ischia, and the forward curve of the lower end of the sacrum.

(4) The iliac fossæ are deep.

SP. 293c.—*A Similar Specimen showing a Greater Degree of Deformity.*

(Cf. Sp. 3116, 3117A.)

PART II.
GYNÆCOLOGY.

I.

TUMOURS OF THE VULVA.

THE labia majora and minora are composed of skin, and may be the site of the same varieties of tumours as affect the skin in other parts of the body, but tumours are also found in connection with structures peculiar to the region such as Bartholin's gland or the canal of Nück.

Tumours of the vulva may be cystic or solid. Amongst the cystic tumours are found :

(a) CYSTS IN CONNECTION WITH THE DUCT OR GLAND OF BARTHOLIN.—The mouth of the duct may be obstructed from inflammation or trauma and retention of the secretions results. A cyst of Bartholin's duct forms a rounded swelling in the posterior part of the vulva on one side or other of the vaginal orifice. As the swelling increases in size the fold between the labium majus and minus is obliterated. The cyst contents consist of the secretions of the gland, either clear or discoloured by blood-pigments. If infection occurs an abscess results.

Cysts in connection with the gland are rarer, the swelling is situated nearer the ischial tuberosity and projects less towards the vulva.

SP. 3035B.—*A Thick-Walled Cyst removed from the Left Labium Majus of a Woman 45 years of age.*

Probably a cyst of Bartholin's duct.

(b) SEBACEOUS CYSTS may arise in the numerous sebaceous glands of the part. They do not differ from sebaceous cysts elsewhere.

(c) DERMOID CYSTS.—“Inclusion dermoids,” like those occurring in the facial clefts and middle line of the body, are occasionally found in the vulva. They are lined with skin and contain hair and sebaceous matter.

(d) HYDROCELE OF THE CANAL OF NÜCK.—The canal of Nück is a process of peritoneum occupying the inguinal canal and extended into the vulva. It is the homologue of the processus vaginalis in the male. It is commonly present as a canal closed at either end. Occasionally the whole canal or isolated portions of it are distended with clear serous fluid constituting a hydrocele. Such a hydrocele forms a swelling in the inguinal canal or labium. It must be remembered that an inguinal hernia occupies a similar situation.

(e) CYSTS OF GÄRTNER'S DUCT.—Gärtner's duct (the Wolffian duct) usually terminates blindly before reaching the uterus; occasionally it may persist throughout its whole length, and travelling down in the wall of the uterus and vagina open at the hymen. Portions of the duct may become distended with fluid and form cystic swellings.

SP. 3035A.—*A Cyst of Unknown Origin which was attached by a slender pedicle to the right labium majus.*

SOLID TUMOURS.

(I) INNOCENT.

(a) HYPERTROPHY OF THE LABIA MAJORA AND MINORA.—In this condition we find overgrowth of the connective tissue, with round-celled infiltration. The skin is thick, tough, and sometimes verrucose. The resulting tumour may attain a large size. Elephantiasis arabum affecting the labia produces a similar tumour.

SP. 3021A.—*The Labia Majora and Mons Veneris greatly hypertrophied.*

The natural shape of the parts is obscured. The skin is dark-brown in colour, coarse and rough. The subcutaneous tissue, seen on section at the sides of the specimen, consists of a fibrous network, in the meshes of which fat is enclosed.

SP. 3019.—*Hypertrophy of the Prepuce.*

A prepuce greatly enlarged, forming a roughly spherical mass, 6 inches in diameter. The base, by which the tumour was attached, is seen on the upper surface of the specimen. On either side of the base a lobe representing the lateral fold of the prepuce sweeps round from the main mass of the tumour to meet its fellow of the opposite side. The surface is covered with thickened skin studded with closely set warts.

SP. 3021.—*The Labia affected with Elephantiasis Arabum.*

(b) PAPILLOMATA.—The vulva may be studded with warts produced as a result of chronic inflammation, particularly in cases of gonorrhœal infection. Isolated single or compound warts like those found on other parts of the skin are also met with.

SP. 3022.—*Two Papillomata or Compound Warts, Removed from the Labia.*

Each springs from a narrow base, possesses a central core of fibrous tissue, branching repeatedly and covered with squamous epithelium. Each forms a lobulated tumour, whose surface is composed of the closely set terminal branches of the central core.

(c) FIBROMATA AND MIXED TUMOURS.—These form rounded tumours situated in the subcutaneous tissues. Sometimes they become pedunculated. Some of these tumours are not pure fibromata but contain fat, muscle, or nervous tissue in addition.

SP. 3024A.—*A Myxo-fibroma of the Labium Minus.*

The tumour is irregularly oval in shape, and divided into an upper and lower portion by a slight constriction. The surface of the upper part is covered with a grey necrotic material; that of the lower part is smooth, pink, and covered with skin like that of the nymphæ. The cut surface is semi-transparent, and marked by extravasations of blood.

Microscopic examination.—The tumour is composed of myxomatous and fibrous tissue.

SP. 3025A.—*Fibroma of the Labia.*

A portion of a fibrous tumour which weighed 8 lb. and was attached by a broad pedicle. It consists of fibrous tissue covered with thickened skin, and is partially divided into two lobes.

(II) MALIGNANT.

(a) CARCINOMA. — Carcinoma of the labium is usually of the squamous-celled type and arises from the epithelium covering the skin. Very rarely it is columnar-celled, arising from the epithelium of Bartholin's gland.

Two types of squamous-celled carcinoma may be distinguished :

(1) A proliferating variety in which growth is more rapid than degeneration, and consequently a tumour is formed projecting above the level of the surrounding skin.

(2) An ulcerating variety in which degeneration keeps pace with growth. A deep ulcer is thus formed, gradually eroding and destroying the tissues involved.

Carcinoma of the vulva is often preceded by leucoplakia, an inflammatory condition in which raised white plaques are found on the surface of the labium. Occasionally carcinoma of the labium is bilateral, the opposite labium becoming infected by contact with the primary growth. The inguinal glands are usually affected early.

SP. 3035.—*Part of a Labium Majus affected by a Carcinomatous Growth.*

The tumour is oval, elevated above the level of

the surrounding skin, and measures $1\frac{1}{4}$ inches in length. The margin is sharply defined and overhangs the normal skin round the base of the growth. The surface is rough and warty. Ulceration has commenced. The tumour has been divided in the middle, and the cut surface shows no deep infiltration of the underlying tissue.

SP. 3034.—*Part of the External Genitalia affected by Carcinoma.*

The growth involves mainly the left labium majus, but extends across the middle line and invades the upper part of the right labium. The margin of the growth is raised above the surrounding skin, but the centre is depressed and ulcerated. The white specks seen on the ulcerated surface are epithelial plugs or cell nests.

Sp. 3034A shows a more advanced stage of the disease.

(b) SARCOMA.—Sarcoma of the vulva is rare. The spindle, round, mixed-celled and melanotic varieties are met with.

SP. 3033.—*Melanotic Sarcoma.*

The external genitalia and lower part of the vagina affected with a melanotic sarcoma. The normal shape of the vulval orifice is lost from invasion and destruction of the tissues. Some of the masses of growth have been divided; their cut surfaces are darkly pigmented, and sharply marked off from the surrounding tissues.

II.

TUMOURS OF THE VAGINA.

VAGINAL CYSTS.

(1) WOLFFIAN CYSTS.

In the female the upper part of the Wolffian duct persists as the duct of Gärtner, but can seldom be traced further than the wall of the uterus. Occasionally it persists throughout its whole length, and can be traced downwards in the lateral vaginal wall to open at the hymen. Cysts may arise from distension by retained secretion of portions of this duct; such cysts may be single, or two or more may be found in the course of the duct. They are seldom larger than a marble, but may attain a much greater size and form a tumour, situated partly beneath the wall of the vagina and partly between the two layers of the broad ligament.

HISTOLOGY.—The wall consists of fibrous tissue lined with a single layer of columnar epithelium, which is sometimes ciliated. Papillomata occasionally spring from the wall. The contents are thin and watery.

(2) GLANDULAR CYSTS.

In the earliest stages of its development the vagina is lined by columnar epithelium, and contains

rudimentary glands. Later, the columnar epithelium is replaced by squamous cells and the glands disappear; occasionally traces of them persist, and may give rise to small retention cysts.

(3) LYMPHATIC CYSTS.

Dilatation of lymphatics due to either obstruction or new-growth may give rise to small cysts.

SOLID TUMOURS.—Myomata, fibromata, and fibromyomata are met with occasionally.

SP. 3028.—*Fibromyoma of the Vagina.*

The tumour is lobulated. Its surface is rough and shaggy as a result of sloughing. The cut surface presents the whorled appearance characteristic of a fibromyoma.

The tumour had been noticed beneath the vaginal wall for three years. It gradually increased in size, and was eventually extruded through the vulval orifice.

SP. 3029.—*A small Fibromyoma the size of a Walnut, removed from the Anterior Wall of the Vagina.*

SP. 3029A.—*Pedunculated Fibromata.*

A lobulated tumour which grew from the mucous membrane of the vagina. It possesses a broad base of vaginal mucosa, to which four lobes are attached by narrow pedicles. The largest of these is deeply stained with effused blood.

HISTOLOGY.—The tumour consists of loose fibrous tissue, through which are scattered many cells of

irregular size and shape. It contains large blood-channels lined by endothelium ; its surface is covered by squamous epithelium.

Removed by operation from the anterior vaginal wall of a primigravida, aged 20, during the eighth month of her pregnancy.

CARCINOMA.

Primary carcinoma of the vagina is rare. It occurs in advanced life, most often in multiparæ, and is of the squamous-celled variety.

Two types are described :

(a) A circumscribed variety which ulcerates early, and is only slightly raised above the surface at the margins of the growths. The base is crateriform, with a hard, irregular, sloughy surface.

(b) A diffuse variety, which involves the whole circumference of the vagina, and converts it into a rigid tube.

In both varieties the inguinal lymphatic glands are involved early. Recto-vaginal and vesico-vaginal fistulæ form sooner or later in the course of the disease.

SECONDARY CARCINOMA of the vagina is common when the primary disease is in the cervix uteri, the urethra or bladder, less common in carcinoma of the vulva, and rare when the primary growth is in more distant parts.

SP. 3031A.—*Primary Carcinoma of the Vagina.*

Part of a carcinomatous growth from the posterior vaginal wall. The growth is $1\frac{1}{2}$ inches in diameter.

Its surface is rough, warty, ulcerated and stained with effused blood. On the cut surface the infiltration of the underlying tissues by the growth can be seen.

Microscopic examination.—The growth is a squamous-celled carcinoma.

SP. 3031.—*Secondary Carcinoma of the Vagina.*

The vulval orifice and adjacent part of the vagina. An irregular warty growth fills the upper part of the vagina. The primary growth was in the right kidney, and reached the vagina by extension along the course of the ureter.

SARCOMA OF THE VAGINA.

Primary sarcoma of the vagina is met with in two forms: (1) As a discrete tumour; (2) As a cluster of polypoid growths. The discrete variety is met with at all ages; the polypoid variety is extremely rare except in childhood.

In the course of its growth the tumour sometimes obstructs the urethra, causing retention of urine, dilatation of the ureters and hydronephrosis. If the growth obstructs the vulval orifice pyocolpos and pyometra may result. Degeneration and sloughing occur early, and by the breaking down of the growth the bladder, the rectum or the peritoneal cavity may be opened.

On microscopic examination the growth is usually of the mixed-celled type, but round and spindle-celled tumours are also found. Myxomatous changes often occur. Muscle-fibres and small masses of

cartilage are sometimes found in the polypoid variety.

SP. 3030.—*Polypoid Sarcoma of the Vagina.*

The specimen consists of a number of polypoid growths removed from the vagina and nymphæ of a child. The largest polyp is about 3 inches in diameter. The irregular opening seen at the cut surface of the largest mass is formed by the urethra.

When fresh the largest mass was opaque white, the others were gelatinous. Under the microscope the tumour is seen to be a mixed-celled sarcoma. Giant cells are present. In some parts myxomatous degeneration has occurred.

SP. 3030A.—*Sarcoma of the Vagina.*

The pelvic organs from a child aged $2\frac{7}{12}$ years. A large round tumour springs from the right wall of the vagina. It has destroyed the mucous membrane and invaded the vaginal canal; from the exposed surface spring numerous polypoid growths.

The urethra is elongated and the bladder distended from the pressure of the growth.

On microscopical examination the tumour is a mixed-celled sarcoma.

SECONDARY SARCOMATOUS DEPOSITS may be found in the vagina, especially when the primary growth involves the uterus.

PRIMARY CHORION-EPITHELIOMA of the vagina has been recorded on several occasions. The vagina is often the site of the earliest secondary growths in chorion-epithelioma of the uterus (see Sp. 3014).

III.

DISEASES OF THE UTERUS.

I.—DISPLACEMENTS OF THE UTERUS.

1. ANTEFLEXION AND RETROFLEXION.

The normal position of the uterus is one of anteversion and anteflexion. The fundus lies a little below the level of the plane of the pelvic brim, near to the symphysis pubis. The cervix, pointing downwards and backwards, lies in front of the lower sacral vertebræ. The position is temporarily altered by distension of the bladder or rectum. Wide variations are found without detriment to health.

Aberrations from the commonest position may be congenital or acquired.

(1) CONGENITAL ABERRATIONS.

(a) ANTERIOR.—The uterus may be more acutely anteflexed than usual. In this case both cervix and fundus point forwards. Sometimes such a uterus is abnormal not only in position but is small and ill-developed, when spasmodic dysmenorrhœa and sterility may be associated with the condition.

SP. 2943 and 2943A.—*Casts of an Anteфлекed Uterus.*

The organ is small and acutely anteфлекed. Both the fundus and cervix point forwards.

(b) POSTERIOR.—The uterus may be retroфлекed, retroverted, or both. When retroфлекed the organ is bent about the level of the os internum and both cervix and fundus point backwards. When retroverted the long axis of the uterus is nearly straight, the os externum points forwards, and the fundus lies at the level of, or below, the promontory of the sacrum.

SP. 2945B.—*Retroflexion.*

A median sagittal section of the pelvis and its contents. The cervix points backwards and lies near the coccyx. The fundus uteri lies low in the hollow of the sacrum. The angle between the body and cervix is unusually acute.

(2) ACQUIRED ABERRATIONS.

Pathological conditions arising—(1) in the uterus, (2) in its surroundings, may modify the position of the organ.

(1) PATHOLOGICAL CONDITIONS OF THE UTERUS.—In metritis and subinvolution the uterine wall is rendered softer and less resilient than usual. The fundus uteri may then fall backwards and assume a position of retroversion and retroflexion.

The growth of a fibroid or other tumour in the wall of the uterus may displace the organ forwards, backwards, or to either side. When a uterus enlarged by fibroids can no longer be accommodated in the

pelvis, it usually rises into the abdomen. In some instances the promontory of the sacrum prevents this change of position; then increase in the size of the tumour produces serious pressure symptoms.

SP. 2944B.—*Fibroid Modifying the Position of the Uterus.*

A sagittal section of the uterus of an old woman showing acute anteflexion of the uterus associated with the presence of a fibroid in its posterior wall. The uterine walls are thin and atrophied, but the cavity maintains its normal length. Two mucous polypi are situated near the fundus.

(2) PATHOLOGICAL CONDITIONS OF THE UTERINE SURROUNDINGS.—(a) Pelvic inflammation may lead to displacement of the uterus by the presence of exudates, which push the uterus away from the affected side, or by the contraction of fibrous tissue formed in the process of recovery which drags the organ towards the original site of the disease (see Sp. 2951E, 2952 and 2953).

(b) Pelvic tumours may displace the uterus, *e. g.* a tumour situated in Douglas's pouch may press it forwards, or in the utero-vesical pouch backwards.

SP. 2916A.—*Tumour of the Ovary Displacing the Uterus.*

A sagittal section of the pelvic organs. The uterus is elongated and displaced by the presence of

a dermoid cyst (*cf.* “Complications of Ovarian Tumours”).

SP. 3091A.

A sagittal section of the pelvic organs shortly after delivery. The uterus enlarged as the result of a recent pregnancy is situated almost entirely above the symphysis pubis. This position is due to a large fibroma of the ovary which lies in Douglas's pouch.

SP. 2951c.

A sagittal section of the pelvic organs. An ovarian cyst is situated between the bladder and the uterus. The uterus is retroverted by the cyst. The pouch of Douglas is obliterated by adhesive peritonitis.

2. PROLAPSE.

A slight descent of the uterus occurs normally when the intra-abdominal pressure is raised, as during the act of defæcation or coughing, but the organ returns to its natural position when the pressure is removed. Prolapse is a pathological descent, and depends upon the insufficiency of the supports of the uterus, or upon a continued increase in the intra-abdominal pressure.

The chief supports of the uterus are :

(1) The pelvic fascia and its local thickenings, viz. a specially strong portion surrounding the cervix and known as the “cardinal ligament of the

uterus," and strong processes surrounding the branches of the uterine artery.

(2) The levator ani muscle.

(3) The pelvic cellular tissue and the fat contained in its meshes.

Of less importance are :

(4) The round ligaments.

(5) The utero-sacral ligaments.

(6) The broad ligaments.

The sufficiency of the supports is determined by—(a) their absolute strength ; (b) the demands put upon them.

(a) THE SUPPORTS THEMSELVES MAY BE WEAK—

(1) From congenital defect.

(2) From injuries caused during childbirth by the passage of the foetus, or from failure of the normal processes of regression during the puerperium.

(3) From old age, wasting diseases, or unduly prolonged lactation.

(b) INCREASED DEMANDS UPON THE SUPPORTS OF THE UTERUS MAY BE MADE BY—

(1) Increase in weight of the uterus.

(2) Increase in the intra-abdominal pressure from ascites, tumours, continued cough, or strain.

The parts involved usually descend thus :

First the anterior vaginal wall, then the uterus in a position of retroversion, and lastly the posterior vaginal wall. Ultimately in extreme cases the inverted vagina lies outside the vulval orifice, forming a hernial sac. The uterus lies in the sac, in close relation to the posterior vaginal wall. In addition to the uterus, the uterine appendages,

bladder, ureters, coils of intestine, and sometimes the rectum may occupy the sac.

Three degrees of prolapse of the uterus are described:

(1) Prolapse of the first degree: The uterus lies at a lower level than the normal, but no part protrudes from the vulva.

(2) Prolapse of the second degree: The cervix protrudes from the vulva, but the body of the uterus lies within the vagina.

(3) Prolapse of the third degree, or frank prolapse: The whole uterus protrudes through the vulva.

PROLAPSE OF THE VAGINAL WALLS.

One or both vaginal walls may descend without alteration in the position of the uterus. The anterior vaginal wall is more often affected than the posterior. The bladder always maintains its relation to the anterior wall and descends with it, but the rectum may or may not descend with the posterior wall.

Prolapse of the anterior wall is known as "cystocele," and descent of the posterior wall when accompanied by descent of the rectum as "rectocele." No special name is applied to prolapse of the posterior wall when the rectum maintains its normal position.

It sometimes happens, especially in prolapse of the second degree, that the vaginal walls and portio vaginalis of the cervix descend while the fundus maintains its usual level. In this event the supravaginal portion of the cervix is stretched and its length much increased. Upon reduction of the pro-

lapse the supra-vaginal portion of the cervix tends to regain its natural dimensions, but complete recovery is prevented by its imperfect elasticity and the fact that some hypertrophy has accompanied the stretching. The parts lying outside the vulva undergo changes. The vulval orifice constricts the portion of the cervix lying in its grip and impedes the venous return. The portion protruding beyond the vulva is thus engorged with blood, becomes œdematous, and varicose ulcers are found on the most dependent part. The exposed vaginal walls are thickened and the superficial layers of its epithelium become dry and horny. The natural rugæ are smoothed out, and ulceration from friction by the thighs and clothing may be found on the portions thus exposed.

SP. 2947.—*Prolapse of the Second Degree.*

A sagittal section of the pelvic contents from a case of prolapse. The vagina is everted, and both its anterior and posterior walls together with the cervix protruded from the vulva. The vaginal mucosa is thickened and its natural rugose appearance is lost. The bladder and the ureters have descended with the anterior vaginal wall. A bristle had been passed into the ureter. The supra-vaginal portion of the cervix is elongated. The utero-vesical and utero-rectal pouches of peritoneum are deepened. During life they contained intestines.

SP. 2946.—*Prolapse of the Second Degree.*

A uterus with the Fallopian tubes and part of the

vagina from a case of prolapse. The length of the uterus from the fundus to the os externum is $4\frac{1}{2}$ inches. The vaginal portion of the cervix is hypertrophied, but the greater part of the increase in length is due to stretching of the supra-vaginal portion.

SP. 2948.—*Prolapse of the Third Degree.*

The body of the pubes with the external organs of generation. The vagina is everted, forming a tumour $7\frac{3}{4}$ inches in length and 13 inches in circumference. On the left side of the swelling a flap has been turned up to display the contents of the sac. At the lowest part lies the uterus with its appendages. The uterus is retroverted and natural in size. Below the pubic arch is seen the bladder. The urethra and ureters are indicated by coloured rods. During life the greater part of the sac was occupied by intestines.

SP. 2947A.

The left half of the pelvic organs from a case of prolapse of the posterior vaginal wall, due to the continued pressure of a collection of pus in the pouch of Douglas. The posterior vaginal wall protrudes from the vulva and its mucosa is thickened. Its descent has not affected the position of the rectum but has carried the cervix uteri through the vulval orifice. The fundus uteri is at its natural level, and great elongation of the supra-vaginal portion of the cervix has taken place.

SP. 2961A.—*Ulcer of the Cervix due to Prolapse.*

Half of a cervix uteri removed by vaginal amputation. It presents an irregular area entirely denuded of mucous membrane. The ulceration is due to prolapse.

Microscopical examination. — The section shows superficial ulceration. There is no sign of malignancy.

3. INVERSION OF THE UTERUS.

Inversion of the uterus may be—

- (1) Acute.
- (2) Chronic.

Acute inversion occurs only in the puerperal state. Chronic inversion may occur also in the non-puerperal uterus.

(1) ACUTE INVERSION can occur only when the cavity of the uterus is enlarged and its walls are relaxed. It may be produced spontaneously or artificially, either by pressure from above or by traction from below.

Spontaneous inversion may be caused (*a*) by pressure from above if violent straining efforts are made to expel the placenta, while the uterine walls are relaxed; (*b*) by traction from below in cases of absolute or relative shortening of the cord, or if the woman be delivered in such a position that the child falls.

Inversion may be produced artificially by attempts to express the placenta by Crede's method in the absence of uterine contractions, or by attempts to

deliver that organ by traction on the cord. The inversion usually commences near the fundus. The process once started, the inverted portion is gradually worked down through the cavity of the uterus somewhat after the manner of an intussusception, until eventually the whole uterus, and sometimes the vagina, are turned completely inside out. After reposition has been effected recurrence may take place and the involution of the uterus may proceed with the organ inverted. When the involution is complete the inversion is said to be chronic.

(2) CHRONIC INVERSION may arise as a sequel of the acute form, or may be caused by the traction of a tumour attached to the upper part of the inner wall of the uterus. The appearances observed vary with the degree of inversion. If slight, no part of the fundus protrudes through the cervix; if more advanced, the cervix is dilated and forms a ring which encircles tightly the inverted fundus; rarely the inversion is complete, that is the organ is turned completely inside out and appears through the vulval orifice as a rounded tumour attached all round to the vaginal walls.

When viewed from above a thick-walled ring almost on a level with the floor of Douglas's pouch marks the site of the uterus. The round ligaments and Fallopian tubes enter the depression in the centre of this ring.

SP. 2949.—*Inversion of the Uterus.*

A uterus and its appendages with part of the vagina. The body of the uterus is inverted, and

is encircled by the cervix, which, however, does not cause any constriction, the finger passing easily between it and the uterine wall. The openings of the Fallopian tubes into the uterus cannot be seen on the inverted surface. The peritoneum at the point of inversion is roughened and uneven. The uterine appendages are drawn into the *cul-de-sac* formed by the inverted uterus. The inversion was irreducible, and the displacement of the uterus caused death in consequence of frequently recurring hæmorrhage twenty-nine months after the accident.

SP. 2950.—*A Uterus and its Appendages.*

The fundus is inverted, and in the sac thus formed a portion of the broad and round ligaments and the Fallopian tubes were found (*cf.* Sp. 2970 and 2973).

II.—ENDOMETRITIS.

(1) ACUTE INFLAMMATION OF THE UTERUS.

Pathogenic organisms may gain admission to the uterus under a variety of circumstances. The commonest methods of infection are :

(1) During labour or abortion.

(2) During operations if the precautions taken to secure asepsis have failed.

(3) By infection of the uterine wall from a focus of suppuration in its neighbourhood.

(4) By an ascending infection from the vagina as in gonorrhœa, malignant disease of vagina, or from the presence of a neglected pessary.

(5) From an ulcerating growth in the body or cervix.

In acute inflammation the uterine wall is usually softened and the mucosa reddened, injected and covered with beads of pus. On microscopical examination the vessels are engorged and the tissues infiltrated with small round cells.

Acute inflammation of the uterus most commonly follows labour or abortion. The separation of the placenta leaves an open wound through which organisms readily gain entrance.

Two types of puerperal infection may be recognised, known respectively as the streptococcal type

and the *Bacillus coli communis* type from the organism most commonly concerned in the production of each variety.

(1) THE STREPTOCOCCAL TYPE.—The uterus is usually of natural size. The involution proceeds at the normal rate, and the lochia cease early or are scanty, watery, and inoffensive. To the naked eye there is little evidence of disease; the walls of the cavity are smooth and sometimes show small petechial hæmorrhages in the mucosa. On microscopical examination the fibromuscular wall shows through its whole thickness small-celled infiltration, the inflammatory cells are scattered throughout, and the streptococci are found to have penetrated as far as the peritoneal covering.

SP. 3094c.—*The Uterus, Tubes and Ovaries from a Woman who died of Septic Peritonitis following Labour.*

The uterus is of normal size; its peritoneal surface is injected, and in places covered by effused lymph. In the right broad ligament is a small abscess cavity. The fimbriæ of the Fallopian tubes are congested, the ovaries are both enlarged, nearly circular in outline, deep purple in colour, and covered on the surface with a layer of yellow lymph. The cut surface shows intense hæmorrhagic engorgement of the cortex, with hæmorrhage into the Graafian follicles. In the right ovary is a single small abscess; in the left ovary are two smaller foci of suppuration. Streptococci were cultivated from the heart's blood of the patient.

(2) THE *BACILLUS COLI COMMUNIS* TYPE.—This variety results from infections by the *Bacillus coli communis*, and certain saprophytic organisms. The uterus is usually bulky and subinvolved, whilst the lochia are profuse, purulent and offensive. The cavity is lined by a layer of necrotic tissue exuding pus, the so-called pseudo-diphtheritic membrane. The uterine wall immediately beneath the necrotic layer is densely infiltrated with small round cells which form a protective barrier against further invasion by the bacilli. In the outer portion of the wall the vessels are dilated and the tissues œdematous. The thrombi closing the uterine sinuses are infected and thrombosis may extend into the large veins. Portions of infected clot may be detached and carried in the blood-stream to the lungs or other parts of the body leading to the formation of pyæmic abscesses.

SP. 3094B.—*The Uterus and Surrounding Structures from a Woman who died of Septicæmia after Child-birth.*

The uterus has been laid open posteriorly and with the cervix measures 4 inches in length. When fresh the walls were spongy and pus was squeezed out of several of the sinuses. The uterine cavity is lined by a rough, flocculent membrane. The left ovary contains a cyst, and there is a focus of suppuration in the right ovary. On the cut surfaces the cellular tissue is exposed, and vessels are seen filled with clot. The right common iliac vein is preserved. It contains a channelled clot extending as high as

the vena cava. The walls of the vein and the surrounding tissue are thickened and inflamed.

CHRONIC ENDOMETRITIS.

Under this term have been included a variety of lesions of the endometrium.

We may differentiate three groups of cases :

- (1) True inflammations of the endometrium.
- (2) Overgrowth of the endometrium.
- (3) Degenerative changes in the endometrium.

(1) CHRONIC INFLAMMATION may be a sequel of the acute variety or may arise without an acute onset.

Causes : (i) Infections during labour or abortion. (ii) Ascending infections from the vagina, *e.g.* gonorrhœa. (iii) Operations upon the uterus where asepsis has not been secured. (iv) The presence of an infected fibroid or of malignant disease in the body of the uterus. (v) Infection of the uterus may occur in the course of a general pelvic inflammation.

In chronic inflammation affecting the endometrium alone the uterus is seldom enlarged. In the earlier stages the endometrium is swollen, reddened and œdematous, and on microscopical examination the interstitial tissue is infiltrated with small round cells most numerous around the capillary vessels. Exudations of serum or blood are seen in the substance of the membrane. Later the stroma is dense and fibrous and the glands atrophied and few in number. The interstitial tissues contain numerous round and spindle-shaped cells, often arranged con-

centrically around the glands, compressing them and partially occluding their lumina. The blood-vessels are few in number, but are easily recognised from their thickened walls and tortuous course.

(2) OVERGROWTH OF THE ENDOMETRIUM (fungus endometritis).—This condition is a new growth rather than an inflammation, and is essentially a diffuse adenoma of the endometrium. The uterus is often somewhat enlarged and its cavity lengthened and dilated. The mucous membrane is pale pink in colour, thickened and spongy; the thickening is sometimes irregular, and may produce polypoid growths of considerable size. Microscopical examination shows that the glands are increased in number (hyperplasia) and in size (hypertrophy). The deeper-lying glands show branching projections which gradually enlarge and develop into new glands, whilst the existing glands are elongated, dilated, and tortuous. The dilated lumina are distended by mucous or blood-stained contents, giving the appearance of numerous small cysts scattered through the mucosa. Invaginations of the stroma covered by epithelium project into many of the gland lumina (Sp. 2977A and 2977B).

(3) DEGENERATIVE CHANGES IN THE ENDOMETRIUM (senile endometritis).—This condition is rare, and its morbid anatomy has been only imperfectly studied. It occurs in women past the menopause. The uterus is small, its walls are thin, and the mucous membrane atrophic. On microscopical examination the columnar epithelium over portions of the mucosa is shed and replaced by squamous cells, or the uterine cavity

may be lined with granulation tissue with no epithelial covering.

CHRONIC METRITIS.

Under the term "chronic metritis" is described a condition of the uterus characterised anatomically by a general increase in thickness of the uterine walls, and clinically by intractable menorrhagia.

Naked-eye appearances: The organ is enlarged in all dimensions, weighing often two or three times as much as the normal uterus. The walls are thickened, hard and firm, and on section bulge outwards. The endometrium is pulpy, increased in thickness, and polypoid processes often project into the cavity.

Microscopic anatomy: On microscopical examination the increase in size is found to be due to a general hypertrophy of the tissues composing the uterine wall. The muscle and fibrous tissue are both increased in amount, usually in due proportion; occasionally the fibrous tissue is in excess. There is no evidence of small-celled infiltration. Changes are found in the coats of the vessels; the outer and middle coats are thickened, and there is sometimes proliferation of the intima with partial occlusion of the lumen. Degenerative changes, both hyaline and colloid, are often seen in the muscle of the uterine wall and of the vessels. Similar changes in the vessels are, however, seen in the uteri of all women who have borne children, and cannot be regarded as necessarily pathological. The endometrium is thickened mainly by hypertrophy and hyperplasia of its glandular elements, and to a less extent by

increase of the tissues of the stroma. It seldom shows evidence of inflammation. The condition is commonest between the ages of thirty-five and forty-five. Apart from this "primary chronic metritis," precisely similar changes are found in cases of fungous endometritis, fibromyomata, or other new growths of the uterus, prolapse, and salpingo-oöphoritis.

The ætiology of chronic metritis is still a matter of dispute amongst pathologists. Scanzoni, who first described the condition, regarded it as the sequel of an acute inflammation of the endometrium. Seifert attributes it to puerperal subinvolution. Cornil believes that the changes in the uterine wall are secondary to arterio-sclerosis of the vessels, whilst later writers regard it as a pure hypertrophy secondary to changes in the endometrium. The cause of the menorrhagia which accompanies the condition is also doubtful; some regard it as due to rigidity of the arteries, others to loss of contractile power in the muscle of the uterine wall.

SP. 2977A.—*Chronic Metritis associated with Hypertrophic Endometritis.*

Half of a uterus, with the uterine appendages of the left side. The uterus shows hypertrophy of its walls, which in the recent state measured $\frac{5}{6}$ inch in thickness. The mucous membrane is thickened and thrown into folds.

SP. 2977B.

Half of a uterus, the walls of which have under-

gone a marked increase in thickness. The organ measures $4\frac{1}{4}$ inches in length and $2\frac{1}{4}$ inches in the antero-posterior diameter. The thickness of the posterior wall is 1 inch. The uterine cavity is dilated, and is lined by a thick, hypertrophied mucosa.

Microscopic examination shows that the increase in thickness of the walls is due to hypertrophy of all the component elements. The glands of the mucous membrane have undergone hyperplasia.

TUBERCLE OF THE UTERUS.

(1) TUBERCLE OF THE CERVIX.

Tuberculous infection of the cervix uteri is rare, and when present is most often secondary to a lesion in some other part of the body. In rare instances, however, the primary focus of infection may be in the cervix. Three varieties are recognised:—

(a) THE MILIARY FORM.—The portio-vaginalis and the mucosa of the cervical canal are studded with scattered tubercles.

(b) THE PAPILLARY FORM.—The cervix is hypertrophied and irregular; projecting from its surface are fungous masses of a pale pink colour, which bleed readily on touch and are liable to be mistaken for carcinoma.

(c) THE ULCERATIVE FORM.—Large or small ulcers, sometimes single, sometimes multiple, are seen on the vaginal portion. In advanced cases the cervix is eroded and excavated. The ulcer has an irregular granular base with raised indurated margins. In

many of the recorded cases the lesion was mistaken for carcinoma, and the true nature of the disease revealed only on microscopical examination.

SP. 2952c.—*Tuberculosis of the Cervix Uteri.*

Half of a uterus showing an ulcer of the cervix. The ulcer involves the lower part of the cervical canal and has destroyed the tissues around the os externum. The base is covered with rough granular material. The upper part of the cervical canal and body of the uterus are unaffected.

Microscopic examination shows numerous giant-cell systems.

(2) TUBERCLE OF THE BODY.

Tubercle of the body is sometimes a primary affection, but more often forms part of a general tuberculosis, or arises by direct extension from the Fallopian tubes. In the earlier stages the mucosa is covered by scattered tubercles; later ulcers make their appearance, and eventually the mucosa may be partly or completely destroyed and its place taken by granulation tissue. The muscular layer usually remains intact for a long time, but in extreme cases is partially destroyed, forming merely a thin bag containing thick pus and caseous material. Sometimes the cervix is occluded, giving rise to hydrometra, and later from secondary infection to pyometra.

SP. 2952D. — *A Uterus showing Tuberculosis of the Mucous Membrane.*

The anterior wall has been cut away. The organ

is enlarged, and the mucous membrane is roughened and nodular throughout its whole extent. No tubercles are now visible to the naked eye.

Microscopic examination.—The section shows much round-celled infiltration of the mucosa, with giant-cells. Caseation has occurred in places.

The patient, aged 23, died of miliary tuberculosis of the lungs, viscera, and peritoneum.

SP. 3004.—*A Specimen similar to the last.*

SP. 3015D.—*A Uterus and Part of the Appendages from a Patient who died of General Tuberculosis.*

The endometrium is rough and ulcerated. The cavity is dilated, and in the recent state contained a slightly gelatinous, curdy fluid. The cervical canal is unaffected. The left Fallopian tube is thickened, and caseous nodules are seen in its wall.

Microscopic examination of the caseous lining of the fundus showed the presence of tubercle bacilli.

PYOMETRA.

Under certain conditions, for example in carcinoma of the cervix, from a fibroid projecting into the cavity, or from cicatricial contraction of the cervix, the canal may become occluded and the uterine secretions retained. As the result of secondary infection the retained secretions become purulent, and the condition is then spoken of as "pyometra." The walls of the uterus are thinned and the cavity is distended, the endometrium is inflamed, its surface epithelium is shed, and ultimately the cavity is lined by a layer of granulation tissue.

SP. 2955.—*The Uterus and Appendages from a Case of Pyometra.*

The cervix is the seat of a carcinomatous growth which has occluded the cervical canal. The cavity of the uterus is much dilated, and in the recent state was filled with pus. The Fallopian tubes are natural.

SP. 2956.—*A Uterus from a Case of Pyometra.*

A fibroid growing in the wall of the uterus, has blocked the cervical canal at its upper end. A glass rod has been passed down the canal, showing that the obstruction is due to pressure exerted by the tumour and not to closure of the canal. Above the obstruction the cavity is dilated, and in the recent state contained pus.

III.—NEW GROWTHS OF THE UTERUS.

NEW growths of the uterus may be classified as follows :—

a. INNOCENT.

(1) OF THE FIBRO-MUSCULAR WALL.

(*a*) Fibromyoma.

(*b*) Fibromyo-adenoma.

(2) OF THE MUCOUS MEMBRANE.

(*a*) Adenoma.

(*b*) Fibroadenoma.

b. MALIGNANT.

(1) CARCINOMA.

(*a*) Squamous-celled carcinoma of the cervix.

(*b*) Columnar-celled carcinoma of the cervix.

(*c*) Carcinoma of the body.

(2) SARCOMA.

(3) CHORION-EPITHELIOMA.

I. INNOCENT NEW GROWTHS.

(1) TUMOURS OF THE FIBROMUSCULAR WALL.

FIBROMYOMATA.

These tumours are frequently multiple ; they arise in the fibro-muscular wall of the body or cervix

during the child-bearing period of life. They vary greatly in size; the smallest can be seen only with the aid of the microscope, the largest form enormous tumours distending the abdomen. The cut surface is pale pink or white, and presents a whorled appearance, due to the wavy arrangement of the fibrous and muscular bands of which the tumour is composed. On microscopic examination the tumour consists of unstriped muscle and fibrous tissue in varying proportion. As a general rule the smallest fibroids contain relatively most muscle. The smallest fibroids consist of an aggregation of muscle-fibres not clearly marked off from the rest of the uterine wall. The larger ones possess a well-marked capsule formed by compression of the uterine tissue in the neighbourhood of the growing tumour.

Concurrently with the growth of the fibroid there is an increase in the size and weight of the uterus. The cavity is elongated and the wall thickened. As a result of the hypertrophy of the uterus and the attendant increase of its vascularity the menopause is delayed. When, however, the changes of the menopause eventually commence, the fibroids share in the retrogression of the uterus and become smaller. There is no evidence that they ever completely disappear.

A fibroid in the wall of the uterus acts as a foreign body and excites contractions which tend to expel it. It will project towards the peritoneal or mucous surface according to the position of its origin. If it arises near the peritoneum it will grow outwards, if near the mucous membrane, inwards. Fibroids are

classified into subperitoneal, interstitial, and submucous, according to the position they occupy. The same uterus frequently contains fibroids of all three varieties.

Submucous fibroids, in addition to their effect upon the uterine muscle, lead to hypertrophy of the mucous membrane. The hæmorrhage, which is the chief clinical symptom of submucous fibroids, is due in part to this hypertrophy. When a fibroid protrudes far into the cavity of the uterus the endometrium atrophies over the most prominent part, but elsewhere the hypertrophy persists.

SP. 2986.—*Part of a Uterus containing many Fibromyomata.*

On the external surface are two well-marked bosses caused by subperitoneal fibroids. On the cut surface numerous fibroid tumours are seen. They present the characteristic whorled appearance, are encapsuled and separated from each other by strands of uterine muscle.

SP. 2987.—*A Uterus and its Appendages.*

The upper part of the uterus contains many fibroid tumours. On the peritoneal surface are bosses caused by subperitoneal fibroids. Close to the insertion of the Fallopian tube is one which has become pedunculated. A sagittal section displays the cavity of the uterus. The cavity is elongated and irregular in shape; in its upper part is a large submucous fibroid, which projects into and

distends it. In the wall are several interstitial tumours.

SP. 2985.—*A Vertical Section of a Uterus enlarged by a Fibroid.*

The Fallopian tubes and ovaries are attached below their usual level owing to the deformity caused by the tumour. The cut surface shows a fibroid growing in the fundus uteri and projecting into the cavity. In its upper and lateral aspects the tumour is surrounded by the wall of the uterus, but below, where it is in relation to the cavity, is covered by the endometrium only.

SP. 2989.—*A Uterus enlarged by a Fibroid in its Posterior Wall.*

At the upper part of the specimen are seen the Fallopian tubes and ovaries. Near the attachment of the right tube is a small calcified, pedunculated, subperitoneal fibroid. The os externum is dilated, admitting the little finger. A glass rod has been inserted into it. The uterine cavity measures $4\frac{1}{2}$ inches in length. The wall of the uterus, except where it is formed by the tumour, is very thin, measuring not more than $\frac{1}{8}$ inch in thickness. The tumour extends from the fundus above to the cervix below. Its cut surface shows the usual appearances of a fibromyoma.

SP. 2987A.—*The Right Half of a Uterus enlarged by the growth of Fibroid Tumours.*

The cavity of the uterus is not elongated but

is slightly tortuous. In the anterior wall of the uterus are several small fibroids near the fundus, and a larger one situated lower down. In the posterior wall is a large interstitial growth and between this and the cervical canal a smaller one.

SP. 2989A.—*Section of a Uterus enlarged by Fibroids.*

In the lower part of the specimen is a large cervical tumour; in the upper part are other fibroids. The large tumour measures $4\frac{1}{2}$ inches in length by $3\frac{1}{4}$ inches in breadth and is situated in the posterior wall of the cervix. In front is the canal, elongated and dilated. The walls of the uterus are irregular and bossed from the presence of fibroids, subperitoneal, interstitial and submucous. The cavity is rendered tortuous by an interstitial growth in the anterior wall, and is dilated by the presence of a fibroid polypus. The peritoneal surface of the specimen is covered with adhesions.

PEDUNCULATED FIBROIDS.

The expulsive force of the uterine contractions may continue to act until the fibroid is attached to the wall by a narrow pedicle only. The pedunculated submucous tumours are frequently called "fibroid polypi."

SP. 2995.—*Pedunculated Fibroids.*

A uterus, with its appendages, containing many fibromyomata. The external form of the uterus is distorted by the presence of a number of fibroids

growing in its wall. They are chiefly subperitoneal and are pedunculated in varying degrees. The cavity of the uterus is elongated, but not tortuous, as the fibroids do not project into it. The largest tumour has been divided and shows calcification (*cf.* "Calcification of Fibroids," p. 158).

SP. 2979A.—*Fibroid Polypus*.

A uterus laid open from the front to show a fibroid tumour in process of enucleation. The tumour is oval and is attached by a narrow pedicle to the posterior wall in the middle line. Its cut surface exhibits the whorled appearance of a fibromyoma. The greater part of the growth lies within the cavity of the uterus as though extruded from the uterine wall.

SP. 2979.

A uterus laid open to display the cavity and its contents. Attached near the opening of one Fallopian tube is a small fibroid tumour. It has been enucleated further from the uterine wall than that of the preceding specimen and is now attached by a slender pedicle. A little above the level of the internal os is seen the stump of another small fibroid which was separated accidentally. The fibroid lies in the bottom of the jar.

COMPLICATIONS OF FIBROID POLYPI.

(1) EXPULSION.—Further contractions of the uterus may expel a fibroid polypus into the vagina or even through the vulval orifice.

SP. 2971.—A *Uterus, the cavity of which contains a large Fibromyoma.*

The pedicle of the tumour is attached high up in the body and has stretched sufficiently to allow the tumour to be extruded from the cervical canal.

(2) STRANGULATION.—During expulsion from the cavity of the uterus the pressure of the cervix may strangulate that portion of the tumour which projects through it; or, after the tumour has escaped, the cervix may compress the pedicle and strangulate the whole mass.

SP. 2990.—STRANGULATED FIBROID POLYPUS.

A fibroid polypus which was attached to the posterior wall of the cervix by a narrow pedicle. The stump of the pedicle is seen near the cut edge of the specimen in its upper part. The tumour is divided sharply into an upper part which presents the usual appearance of a fibroid, and a lower part which is red in colour and contains many dilated blood-vessels. This condition of engorgement was brought about by the pressure of the margins of the cervix uteri, as the tumour lay half in the cervical canal and half in the vagina.

(3) DIVISION OF THE PEDICLE.—During the expulsion of a fibroid polypus the pedicle may become stretched and thin. Sometimes it gives way and a spontaneous cure of the growth is thus effected.

(4) INVERSION OF THE UTERUS.—When the pedicle of a fibroid polypus is attached near the fundus uteri

traction is exerted upon the point of attachment during the process of expulsion of the tumour. Inversion of the uterus may result.

SP. 2973.—*Inversion of the Uterus.*

A uterus and part of the vagina and vulva containing a large fibroid tumour. The fibroid is attached by a broad, short pedicle to the fundus and left wall of the uterus. It has dragged upon its attachment, causing a slight degree of inversion. The lowest part of the tumour is ulcerated. The cervical canal is widely dilated, the external os surrounding the greatest diameter of the tumour. The cervix appears as a ridge crossing transversely the reflected portion of the specimen. The vaginal walls are ulcerated.

SP. 2970.

This specimen closely resembles the last, but the tumour is smaller, its pedicle longer, and the inversion of the uterus greater.

FIBROMYOMA TELANGIECTOIDES.

This is a rare form of fibromyoma in which the blood-vessels are more numerous and larger than usual. On section the tumour is composed mainly of fibro-muscular tissue, but the numerous dilated blood-vessels, some of them containing thrombi, are a striking feature. In extreme cases the vascular spaces occupy the greater part of the tumour, and the fibromyomatous stroma appears only as a supporting framework. A great but temporary increase in size

occurs at the menstrual periods, for the tumour shares in the general engorgement of the pelvic viscera.

SP. 2983A.—*A Fibromyoma Telangiectoides*.

A portion of a uterine fibromyoma. Numerous large vascular spaces, some of them containing clot, are seen on the cut surface.

Microscopic examination.—The tumour is a fibromyoma, and embedded in it are numerous vascular spaces, some surrounded by thick wall, others lined merely by a single layer of endothelium.

FIBROMYO-ADENOMATA.

These tumours resemble closely the fibromyomata, but in them are embedded strands of tissue like that of the uterine mucosa, consisting of both glandular elements and interglandular stroma. Two varieties are recognised, the diffuse and the circumscribed.

In the diffuse variety the uterus is enlarged and the walls are thickened, but no definite tumour can be recognised. The fibromyo-adenomatous growth may involve the whole uterus or may be localised in one portion. Anatomically the areas of mucosa in the growth are continuous with the mucosa lining the uterine cavity, and probably take part in the menstrual cycle and undergo a decidua-like change during pregnancy.

In the circumscribed variety the growths are encapsuled, and arising in the uterine wall may, like the fibromyomata, become subperitoneal, submucons, or polypoid. The connection between the mucosa of

the tumour and the endometrium which is evident at first becomes lost during the process of development.

There is no specimen in the museum.

SECONDARY CHANGES IN FIBROMYOMATA.

Fibromyomata are liable to degenerative changes.

(1) CALCIFICATION.

In fibroids of long standing plaques and spicules of carbonate and phosphate of lime may be deposited. Subperitoneal fibroids are most commonly affected. The earthy matter may be distributed equally through the tumour or may be deposited chiefly on the surface forming a complete calcareous envelope like the shell of an egg. The process may advance to such a degree that ultimately the whole tumour is composed of earthy matter. Calcified fibroids are sometimes dug up in burial grounds and are popularly known as "womb-stones."

SP. 2996.—*The Right Half of a Uterus containing a Fibromyoma.*

The tumour is partially enucleated from the wall of the uterus. It shows spicules of calcareous matter throughout its substance, and on the surface a complete calcareous envelope.

SP. 2995.—*A Uterus containing many Fibromyomata.*

A section of one of them shows calcification. The most extensive deposit is on the surface (see also Sp. 2997).

SP. 2996A.—*A Calcified Fibroid Bisected and Dried.*

On the outside the calcareous deposit is dense and laminated, forming a complete shell for the tumour. The central portion has a cancellous arrangement.

SP. 2995B.—*A Womb-stone, probably a Calcified Fibromyoma.*

It is oval in shape and measures $2\frac{3}{4}$ inches by $2\frac{1}{4}$ inches. The outer aspect is extremely jagged and rough. The cut surface gives the impression of a bony matrix infiltrated by salts. Analysis shows that the greater part of the stone is organic in nature. Of the ash remaining after calcination a large proportion is composed of carbonates and phosphates. It was expelled into the vagina spontaneously and removed by the aid of a cephalotribe.

SP. 2998.—*Pieces of Calcareous Material in Coral-like Masses deposited in a Fibromyoma.*

(2) CYSTIC DEGENERATION.

In this condition cyst-like spaces filled with serous or mucinoid fluid are seen. Such spaces are formed as the result of tissue degeneration. Their walls, which may be smooth, or rough and irregular, consist of degenerate fibrous and muscular tissues.

SP. 2996F.—*Mucinoid Degeneration.*

The specimen is part of a fibroid showing mucinoid degeneration. The cut surface illustrates various stages in this process. At the lowest part is an area

of tissue which has undergone but little degeneration. Above this is an area in the main solid, but semi-transparent from mucinoid degeneration of the tissues. The rest of the tumour is composed of cystic spaces containing mucinoid material separated from one another by fibrous septa.

SP. 2992A and 2992A₁.—*Cystic Fibromyomata*.

Portions of fibroids in which cystic spaces have developed. There is no epithelium lining the spaces.

(3) RED DEGENERATION (NECROBIOSIS).

In this form of degeneration the fibroid is softened, vascular, and stained a red colour by diffusion of blood-pigments through the tissues of the tumour. The capsule often shares in the process, so that the line of demarcation between the tumour and the uterine wall is obscured. The change occurs most commonly in association with pregnancy, but its cause is unknown. It does not depend upon infection with septic organisms, for the tissues of a necrobiotic fibroid are usually sterile, nor have any gross changes been detected in the blood-vessels. These tumours have a curious penetrating odour like that of rotten fish. This form of degeneration does not necessarily destroy the vitality of the tumour. On microscopic examination it is seen that the nuclei of the muscular and fibrous tissues stain badly, whilst patches of round-celled infiltration appear in the neighbourhood of the blood-vessels.

SP. 2996E.—*Red Degeneration.*

A uterus containing a large fibromyoma. At one side of the specimen is the uterine cavity. The anterior wall is occupied by a large interstitial tumour, blue in colour, and showing commencing cyst formation. In the recent state it was softened and uniformly red.

Microscopic examination.—The tumour is unusually vascular. In places the tissues are very degenerate, and nuclear staining is lost. Patches of round-celled infiltration are seen.

SP. 2996G.—*Red Degeneration.*

Half of a uterus containing a fibromyoma in the posterior wall. At one side is seen the cavity of the uterus, 5 inches in length, distorted by the tumour. The cut surface is now a purple colour. In the recent state the tumour was soft, semi-fluid, and bright red.

Microscopic examination shows that all nuclear staining is lost, and in places infiltration with polymorphonuclear leucocytes has occurred.

(4) NECROSIS.

If the degeneration is sufficiently severe to cause the death of the tissues the process is spoken of as necrosis. Necrosis is not the result of septic infection but depends upon loss of nutrition. The central portion of the tumour, that is, the portion most distant from its blood supply, is affected more than the periphery. The tissues affected are softened and ultimately disintegrate, so that a cavity

is formed bounded by ragged, irregular walls and occupied by molecular *débris*.

SP. 2996B.—*Necrosis*.

Portions of three contiguous fibromyomata. The central portions of the two upper tumours have undergone necrosis. The degenerate portions are represented by cavities with irregular walls which originally contained fluid *débris*. The third tumour shows no evidence of degeneration.

SEPTIC INFECTION OF FIBROIDS.

Sloughing and gangrene are invariably the result of infection by septic or putrefactive micro-organisms. They occur most commonly in a tumour whose vitality has been lowered as the result of injuries during child-birth or strangulation by the vulva or cervix during its extrusion from the uterus. Affecting the surface first, the septic process may eventually involve the whole tumour. The surface is covered by shaggy, irregular sloughs, and in the deeper parts are abscess cavities filled with pus.

SP. 2990.—*A Gangrenous Fibroid*.

A fibroid polypus removed when in the process of spontaneous expulsion. The lower part, which protruded from the vagina, is congested and its surface covered by superficial sloughs.

SP. 2992.—*A Gangrenous Fibroid*.

Part of a large fibromyoma. The outer surface is

rough and shreddy from the presence of sloughs. The deeper parts are unaffected.

SP. 2992B.—*A Uterus with a Large Fibroid growing from the Lower Part of its Anterior Wall and projecting through the Cervical Canal.*

The free surface is shaggy from the presence of flocculent sloughs. Cavities originally filled with pus are seen in the substance of the tumour.

SP. 2992C.—*A Uterus containing Multiple Fibromyomata, one of which has become Gangrenous.*

The uterus is enlarged in all directions, and its walls thickened. Occupying the fundus is a gangrenous fibromyoma containing many cavities, which in the recent state were full of pus. The mucous membrane which covered it has been destroyed by ulceration. Embedded in the uterine wall are many small interstitial tumours (see also Sp. 2973).

MIXED DEGENERATIONS.

The same tumour may exhibit several of the varieties of degenerative changes just described.

SP. 2996D.—*Red Degeneration with Calcification and Mucinoid Change.*

The specimen shows half a uterine fibroid. The tumour is divided into an upper crescentic and a lower rounded portion. In the recent state the upper portion showed the changes of red degeneration, and in places the degenerate tissues

are infiltrated with calcareous salts. The lower portion shows mucinoid degeneration.

SP. 2996C.—*Red Degeneration with Calcareous and Hyaline Change.*

A section of a uterus containing numerous fibroids, one of which lies free in the uterine cavity. The largest fibroid has undergone red degeneration and is composed of soft brain-like material. Embedded in it is an oval area, enclosed in a dead-white ring of hyaline material. The tissues inside the ring, which in the recent state were of a reddish colour, are impregnated with calcium salts.

SP. 2956A.

A vertical section of a uterus in a condition of hæmatometra, with a fibroid in the anterior wall. The whole mass when fresh weighed 21 lb.

The uterus is enlarged, its walls hypertrophied, and its cavity dilated. In the recent state the cavity was filled with blood-clot. The fibroid measures 7 inches by $8\frac{1}{2}$ inches. The external portion is calcified, whilst the central part has undergone red and mucinoid degeneration. A cavity with ragged walls occupies its centre. This cavity communicates through an irregular opening with the cavity of the uterus.

The patient suffered from menorrhagia for twelve years. This ceased suddenly $3\frac{1}{2}$ years before the removal of the tumour. Irregular, severe, contractile pains followed the cessation of the hæmorrhage.

THE RELATION OF FIBROMYOMA TO CARCINOMA AND
SARCOMA OF THE UTERUS.

(1) FIBROMYOMA AND CARCINOMA.

No causal relation exists between carcinoma of the uterus and fibromyomata, but owing to the commonness of the two diseases it is not surprising that they are occasionally found in the same uterus. A carcinoma cannot originate in a fibromyoma for these tumours contain no epithelial elements, but arising in the mucosa of either the body or cervix the cancer may invade and infiltrate a fibroid in its neighbourhood.

Sp. 3004c.—*Fibromyoma and Carcinoma.*

A uterus containing a large subperitoneal fibromyoma together with a carcinoma of the cervix. The cervical portion of the uterus is elongated. Its lips are thickened and infiltrated with a carcinomatous growth the surface of which is ulcerated.

Microscopic examination.—The cervical growth is a squamous-celled carcinoma. The fibroid is composed of fibrous and muscular bundles (see also Sp. 3004A).

Sp. 3004c₁.

A uterus divided by a coronal section to show the co-existence of carcinoma and fibromyoma. The viscus is enlarged in all diameters and its walls are thickened. A fibromyoma occupies the fundus. In the situation of the uterine cavity is a white, friable

growth, which has infiltrated the fibro-muscular stroma of the uterine wall and cervix below it.

Microscopic examination shows that the growth is a columnar-celled carcinoma.

SP. 3004B.

A uterus laid open to show a carcinoma of the body associated with a fibroid tumour. The hard, round white tumour situated in the uterine wall near the fundus is a fibromyoma. The yellow and red disintegrating tissue, which fills the cavity and infiltrates the walls of the uterus, is a carcinoma of the columnar-celled type.

SP. 3004c₂.—*Carcinoma invading a Fibromyoma.*

Half of the body of a uterus divided longitudinally to show the invasion of a fibromyoma by carcinoma. The uterus is enlarged and on its outer surface are several subperitoneal fibroids. The cut surface shows many interstitial tumours. The central portion of the specimen is occupied by a roughly circular mass of growth, which is a fibromyoma in process of invasion by a columnar-celled carcinoma which has originated in the uterine mucosa.

(2) FIBROMYOMA AND SARCOMA.

Fibromyomata and sarcoma may co-exist in the same uterus under three different conditions:—

(1) Two separate tumours may be found, one a fibroid, the other a sarcoma.

(2) A sarcoma originating in the uterine wall may in its growth invade a fibroid.

(3) The sarcoma may have its origin in the fibroid.

The sarcomata may be of either the round or spindle-celled variety and frequently contain giant-cells.

Sp. 3015A₂.—*Sarcoma and Fibromyoma co-existing.*

A section of a uterus containing fibroids, which has become the seat of a sarcomatous growth. A pedunculated subperitoneal fibroid is seen near the fundus. Projecting into the uterine cavity is a second tumour, white in colour and with no definite capsule.

On microscopic examination it is found to be a mixed-celled sarcoma.

Sp. 3015A₃.—*Sarcoma arising in a Fibromyoma.*

The left half of a uterus, showing a sarcomatous growth originating in a fibromyoma. The organ is enlarged, and presents on its peritoneal aspect a number of bosses caused by fibromyomata. At the bottom of the specimen is the cervix uteri, dilated and patulous; the supra-vaginal portion is stretched to a length of $2\frac{1}{4}$ inches. The greater part of the specimen, as is shown by the cut surface, is composed of a group of tumours growing in the anterior wall of the uterus. At the lower part of the section is the uterine cavity, dilated and occupied by a fibroid polypus. The axis of the cavity is almost at right angles to that of the cervical canal. The walls of the uterus are hypertrophied and contain several interstitial tumours.

The uppermost of these consists of dense white tissue. Below is a mass of similar tissue interspersed with patches of a brownish friable material, closely resembling blood-clot. The whole mass is encapsuled. Although the white fibromyomatous tissue has been extensively invaded, the uterine wall appears to be free from growth.

Microscopic examination shows that the dense white material in all three tumours is fibromyomatous, while the brownish friable portions are sarcomatous and contain round, spindle and giant-cells.

FIBROMYOMATA AND PREGNANCY.

The presence of fibromyomata in the uterus does not prevent conception, but pregnancy is less likely to occur where submucous fibroids exist than in a healthy uterus, and there is a greater danger of abortion. As pregnancy advances fibromyomata share in the hypertrophy of the uterus. They become softer and more vascular. Degeneration is frequent, especially the mucinoid and red varieties.

Incarceration of a uterus containing fibroids may result from the rapid increase in size which accompanies pregnancy, particularly if the tumour is situated low down in the posterior wall. During labour fibroids are usually drawn up above the brim of the pelvis by contraction and retraction of uterus, but should they lie in front of the presenting part they may fail to rise out of the pelvis and cause obstruction to delivery (see "Obstructed Labour"). Further, if the placenta be implanted wholly or in part upon

the fibroid, morbid adhesions and post-partum hæmorrhage may result.

During the puerperium fibroids decrease in size and may be expelled by the uterine contractions. Septic infection and sloughing may follow injuries received during parturition.

SP. 3090B.—*A Cervical Fibroid complicating Pregnancy.*

The left half of a uterus at the end of the second month of gestation. A large fibroid occupies the posterior part of the cervix. The embryo with its placenta and membranes lies in the cavity of the uterus. Numerous blood-vessels can be seen beneath the capsule of the tumour. The cut surface shows commencing mucinoid degeneration (see also Sp. 3090A).

SP. 3090C.—*Incarceration of Fibromyoma.*

A pregnant uterus removed during the fifth month of gestation containing fibromyomata. Attached to the uterus are a number of subperitoneal fibroids of varying sizes. One of these, kidney-shaped and covered by dilated veins, grows from the posterior wall close to the cervix. It measures $6\frac{3}{4}$ inches in length and $3\frac{1}{2}$ inches in width. A section through the tumour shows a dense fibrous capsule enclosing a mass of pale fibromyomatous tissue, which has undergone extensive mucinoid degeneration. A window cut in the anterior wall of the uterus discloses the foetus.

Removed by operation from a woman, aged 40. The operation was performed on account of incarceration of the kidney-shaped fibroid in the pelvis.

SP. 3090.—*Sloughing following Injuries inflicted during Parturition.*

A uterus and its appendages from a woman who died of peritonitis following delivery. The uterus contains two fibroids, one in the anterior wall, the other in the posterior. The latter has been laid open and shows a number of small cavities with shaggy walls. Over a considerable area the capsule has given way, and the protruding portion of the tumour is sloughing. The cavity of the uterus is dilated; its walls are roughened and shaggy.

The tumour in the posterior wall obstructed delivery, which was finally accomplished by version. No further details are given in the history, but it is probable that the fibroid was injured by attempts to drag the child past it and that sloughing resulted.

(2) TUMOURS OF THE MUCOUS MEMBRANE.

Innocent new growths of the endometrium are composed of glandular elements embedded in a connective-tissue stroma, and resemble in their histological characters the tissues of the membrane in which they originate. They are divided into adenomata and fibro-adenomata, according to the relative amount of glandular and connective tissue which they contain.

ADENOMATA.

Two varieties are recognised, the diffuse and the polypoidal. They may co-exist in the same uterus.

DIFFUSE ADENOMA ("fungous endometritis").—(See page 139.) The mucous membrane is thickened and pulpy, the glands are increased in size (hypertrophy) and in numbers (hyperplasia).

SP. 2977A.—*Diffuse Adenoma.*

Half of a uterus with the appendages of the left side. The walls are hypertrophied, and measured in the recent state $\frac{5}{6}$ inch in diameter. The endometrium is thickened and thrown into folds. The patient suffered from spasmodic dysmenorrhœa.

SP. 2977B.

Half of a uterus whose walls are much thickened. The posterior wall measures 1 inch in thickness. The cavity is slightly dilated, and is lined by a thick hypertrophied mucosa.

POLYPOID ADENOMATA (mucous polypi).—These are small growths seldom attaining a size greater than that of a walnut, and attached by a stalk to the mucosa of either the cervix or body, but more commonly the cervix. Histologically they are composed of the same elements as the endometrium, namely, of glands lined by columnar epithelium embedded in a connective-tissue stroma. The surface of the polypus is covered by a layer of epithelium,

usually columnar, occasionally squamous. These small growths are very vascular, numerous thin-walled vessels passing from the endometrium to the stalk of the tumour. The glands may be dilated into cyst-like cavities, giving on section a honey-combed appearance to the polyp—"channelled polypus." The connective-tissue stroma often undergoes myxomatous degeneration.

SP. 2963.—*Mucous Polypus of the Cervix.*

A cervix uteri from which is growing a mucous polypus. The cervical canal has been laid open, displaying a small pedunculated tumour.

SP. 2963A.—*A Similar Specimen.*

SP. 2967C.

A uterus from the cervix of which a mucous polypus is hanging. The polypus is of larger size than usual.

SP. 2966.—*Mucous Polypus of the Body.*

A uterus laid open to display a mucous polypus in its interior. The polypus is pear-shaped and attached by a narrow pedicle.

SP. 2965.—*A Similar Specimen showing Three Polypi.*

SP. 2967B.—*Channelled Polypus.*

The specimen shows a cervical polypus containing numerous cysts, large in proportion to the tumour. These in the recent state were filled with thick mucus.

SP. 2967A.

A similar specimen from the body of the uterus. It contains numerous small cysts. A larger one involves nearly the whole length of the tumour.

FIBRO-ADENOMATA.

These tumours are composed of glandular elements lying in a connective-tissue stroma. The stroma is denser, the proportion of stroma to glandular tissue greater and the size larger than that of the adenomata. In appearance they are firm, rounded tumours, usually encapsuled or pedunculated, but sometimes not sharply marked off from the endometrium. Distributed through their substance are cystic spaces filled with mucus, which may be clear or stained with pigment derived from the blood.

On microscopic examination the stroma consists of a fibro-cellular connective tissue, in which are a few unstripped muscle-fibres. The cystic spaces are lined with columnar epithelium.

SP. 3000A.—*Fibro-adenoma.*

A small fibro-adenoma of the uterus which has been divided mesially. Numerous cysts are seen on the cut surface. The largest is $\frac{1}{4}$ inch. in diameter. The contents have escaped in most instances, but in the upper part are seen cysts with milky contents, and in the lower part others with brown.

Microscopic examination.—Tubular glands lined with columnar epithelium are found lying in a

stroma like that of the uterine mucosa. The glands are dilated in parts to form the cysts seen by the naked eye. They still retain their epithelial lining. The stroma has undergone myxomatous degeneration.

SP. 2960C.

A portion of a uterus showing a polypus growing from the fundus. The polypus measures about $1\frac{1}{2}$ inches in diameter. It is irregularly rounded and its surface covered with bosses. It fills the uterine cavity.

Microscopic examination.—The section shows a connective-tissue stroma in which lie glands lined with columnar epithelium. Some of the glands are dilated and their walls folded in a wavy manner.

SP. 2960A.—*Diffuse Adenoma of the Cervix.*

The specimen shows a rounded tumour which was attached to the anterior lip of the cervix uteri. On the upper aspect of the specimen is seen the line of attachment of the tumour to the uterus. The tumour has been cut in two; the outer part is smooth and covered with mucous membrane; the inner or cut surface is riddled with small cavities contained in a fibrous framework.

Microscopic examination.—The cavities are lined with a single layer of columnar epithelium. The stroma consists of fibrous tissue, in parts inflamed, and in parts undergoing myxomatous degeneration.

SP. 2960B.

A section through the uterus, vagina, and bladder

showing a large fibro-adenoma occupying the posterior part of the cervix. The mass forms a rounded swelling projecting into the vagina. The cervical canal is marked by a glass rod; its walls are ragged and sloughing. The cut surface of the tumour shows a mass of cysts of varying size enclosed in firm fibrous tissue. The contents of the cysts vary; mucus, altered blood, and a cheesy substance are found. A second glass rod is passed through a small vesico-vaginal fistula.

Microscopic examination.—The tumour is composed of a fibrous-tissue stroma in which are embedded cysts lined by columnar epithelium.

SP. 2960D.—*A Fibro-adenomatous Tumour of the Uterus.*

The tumour is an elongated irregular mass, divided about its middle by a deep constriction. It consists of firm fibrous tissue, enclosing a large number of cysts containing mucus. The cavities are much more numerous in the basal portion of the growth than in the tongue-shaped extremity. It protruded from the cervix, and was attached by a small pedicle to the wall of the uterine cavity.

Microscopic examination. — The section shows numerous cavities lined by a columnar epithelium enclosed in a framework of fibrous tissue.

IV.

MALIGNANT DISEASE OF THE UTERUS.

(I) CARCINOMA OF THE CERVIX.

CARCINOMA of the cervix occurs most frequently between the ages of thirty-five and fifty, but a considerable number of cases are found above and below these limits. It is rare in women who have never been pregnant—between 1 and 2 per cent. of the cases only occur in nulliparæ—and is more common in those who have had many children than in those who have had but few. The profound changes undergone by the uterus during pregnancy, together with the stretching and laceration during parturition, may predispose to cancer, but there is no evidence that the disease occurs more frequently with deep tears, or that it commences in the site of a laceration.

Three varieties of epithelium are found in the cervix. The portio vaginalis is covered with a layer of stratified squamous epithelium, the canal is lined by a single layer of columnar ciliated epithelium, and the glands by a layer of columnar non-ciliated epithelium. The columnar epithelia rest on a basement membrane. The junction of squamous and

columnar epithelium in the virgin is just inside the os externum, but in the parous the squamous epithelium may reach almost to the os internum. When erosions are present columnar epithelium is found on the vaginal aspect.

Carcinoma may arise in either the squamous or columnar epithelium. The squamous-celled type is much commoner, constituting 87·4 per cent. (Cullen) of the cases. A growth commencing on the portio vaginalis is usually squamous-celled, and one commencing in the canal columnar-celled, but owing to the variations in the epithelium above described there are many exceptions to this rule. Further, a growth commencing in the deeper part of the cervical glands may reach the surface of the portio vaginalis before it reaches the canal, and appear to rise in the former situation.

MICROSCOPIC APPEARANCES.—The histological appearances of the squamous-celled type resemble those found in cancer of the tongue and other structures covered with squamous epithelium. Branching columns and masses of squamous cells are seen, infiltrating the fibro-muscular tissue of the cervix and filling the lymphatics. At first the fibro-muscular tissue forms a support for the invading columns of cells, but later is destroyed by them, so that in the older parts of the growth the cancer-cells occupy almost the entire field. The cells exhibit the changes of anaplasia, that is, show variations from the normal in size, shape, and the characters of the nuclei. The shape of the cells is often spheroidal, the nuclei show irregular mitotic

figures, while some are much larger than the normal, and stain deeply with nuclear stains. Round-celled infiltration of the fibro-muscular tissue is found in the neighbourhood of the advancing cell columns. Fatty degeneration and necrosis are always present in the older parts of the tumour, leading to ulceration of the surface and destruction of the superficial parts of the growth.

The columnar-celled type presents the same appearances of infiltration cell anaplasia and degeneration, but the cells are arranged in the form of irregular anastomosing tubes lined by several layers of columnar-celled epithelium. The lumina of the tubes are sometimes occluded by masses of shed epithelial cells.

NAKED-EYE APPEARANCES.—The squamous and columnar-celled varieties can be differentiated with certainty only by microscopic examination. A growth situated on the portio vaginalis is usually squamous-celled, and one situated within the canal columnar-celled, but to this rule there are exceptions, as previously pointed out.

The naked-eye appearances differ according as tumour formation, infiltration or degeneration form the most marked feature of the growth. We may recognise the following types:—

(1) WITH TUMOUR FORMATION.—The growth penetrates and destroys the tissues in which it grows to a relatively small extent, but from the rapid proliferation of its constituent cells forms a tumour raised above the surface. At first the outgrowth consists of buds of epithelium; later these form

papillary processes, into which grows a connective-tissue core, carrying blood-vessels with it. The resulting mass may be so large as to fill the vagina. Its surface is covered with sloughs, is hard, friable, and bleeds easily. When the base is small and the papillary processes well marked, the name "cauliflower excrescence" is given to the condition. So long as the surface of the growth is intact the discharge is clear, watery, and inoffensive, but sooner or later infection and necrosis occur, and the discharge becomes offensive, sometimes thin and watery, sometimes thick and purulent; in many cases it is not blood-stained.

SP. 3008D.—*Carcinoma of the Cervix with Tumour Formation.*

Half of a uterus, showing a fungating warty growth springing from the anterior lip of the cervix. The growth occupies the vaginal aspect of the cervix, and to a small extent the lower part of the canal. It does not reach the anterior reflexion of the vagina. The subjacent tissue is infiltrated by the growth. In the posterior lip is a cyst with smooth walls, which in the recent state was filled with clear fluid. There is no hypertrophy of the uterine body.

Microscopic examination shows that the growth is a columnar-celled carcinoma.

SP. 3009B.

Half of a uterus, showing a mushroom-shaped growth springing from the anterior lip of the cervix.

The base of the growth is thick and short. It is situated on the vaginal aspect of the cervix, and does not involve the cervical canal or the vaginal wall. The surface of the growth is rough and ulcerated.

Microscopic examination shows that the growth is a squamous-celled carcinoma.

SP. 3009A.

A uterus showing carcinoma of the cervix. The anterior lip is greatly enlarged and thickened by the presence of a growth which projects into the cervical canal and extends forwards as far as the anterior vaginal reflexion. The surface of the growth is irregular and ulcerated. The posterior lip is apparently not involved. The body of the uterus is hypertrophied and its walls thickened.

Microscopic examination. — The growth is a squamous-celled carcinoma.

SP. 3006E.

A uterus showing carcinoma of the cervix. The whole cervix is enlarged by the presence of a growth which extends half-way up the cervical canal and covers the vaginal aspect. The tissues on the cut surface are deeply infiltrated. The surface of the growth is ulcerated and irregular. The body of the uterus is hypertrophied.

Microscopic examination. — The growth is a columnar-celled carcinoma.

SP. 3009D.

A uterus showing carcinoma of the cervix. The

situation of the cervix is occupied by an irregular, warty, ulcerated mass which projected into and distended the vagina.

Microscopic examination. — The growth is a squamous-celled carcinoma.

(2) WITH INFILTRATION. — In this variety the growth extends deeply and widely into the tissues of the cervix without forming a projecting tumour and without extensive ulceration. It usually arises in the cervical glands or high up in the cervical canal. The presence of the growth may not be suspected until the surface is invaded or a cavity is formed from sloughing of the mass.

3006c.—*Carcinoma of the Cervix with Infiltration.*

Half of a uterus divided in the sagittal plane to show a carcinoma of the cervix. The growth appears externally as a small ulcer round the os externum, but has infiltrated nearly the whole of the interior of the cervix, and reaches the os internum. The centre of the growth is breaking down, and a small ragged cavity is seen communicating with the cervical canal.

The body of the uterus is hypertrophied.

Microscopic examination. — The tumour is a squamous-celled carcinoma.

3008c.—*Half of a Uterus showing Carcinoma of the Cervix.*

The situation of the os externum and lower part of the cervical canal is occupied by an ulcerated growth with rough, irregular walls.

The growth has extensively infiltrated the cervix, and passing above the os internum involves the lower half of the body of the uterus.

Microscopic examination. — The growth is a squamous-celled carcinoma.

(3) WITH ULCERATION.—In this variety necrosis proceeds almost as rapidly as growth. Ulceration may be present from an early stage, or may supervene in either of the varieties just described after the growth has attained a considerable size.

As a result the natural conformation of the cervix is lost, and the vaginal vault is occupied by a crateriform ulcer, with a hard friable surface and raised margins. It bleeds easily on touch and discharges an offensive watery or purulent fluid, frequently discoloured by blood.

SP. 3008B.—*Carcinoma of the Cervix with Ulceration.*

On the portio vaginalis is a shallow, irregular ulcer which extends round the os externum but is situated chiefly on the posterior lip. The peritoneal covering of the uterus is rough from the presence of numerous adhesions.

Microscopic examination. — The growth is a squamous-celled carcinoma.

SP. 3004D. — *A Uterus showing Carcinoma of the Cervix and Adenoma of the Endometrium.*

The cervix is expanded by a carcinomatous growth which extends as high as the os internum. The growth has undergone extensive necrosis and left an excavated ulcer with rough, shaggy walls.

At the fundus is a soft papillomatous growth entirely confined to the endometrium.

Microscopic examination.—The cervical growth is a columnar-celled carcinoma; the fundal growth is stated to be an adenoma “consisting of tubes lined by more or less regular columnar epithelium.”

SPREAD OF CANCER OF THE CERVIX.

(1) THE UTERUS.—In cases of carcinoma arising in the cervical canal the cervix may be extensively invaded and destroyed, leaving only the mucosa of the portio vaginalis and a mere shell of fibromuscular tissue before the growth appears on the vaginal aspect. It is comparatively seldom, however, that carcinoma of the cervix spreads up into and involves the body of the uterus; there appears to be a natural barrier at the level of the os internum which prevents the spread of the growth upwards. An exception to this rule is seen in Sp. 3008c. Occasionally separate masses of growth are found in the walls of the corpus uteri.

(2) THE VAGINAL WALLS.—In growths commencing on the portio vaginalis the vaginal walls are involved early, either by direct continuity or by implantation of cancer-cells from contact with the growth.

The whole thickness of the wall is infiltrated together with the underlying tissues. The surface of the growth undergoes necrosis, and the resulting ulcer has a hard, raised margin and an irregular, friable base, on which are seen minute red spots corresponding to the papillæ of the submucous tissue.

(3) THE PELVIC CELLULAR TISSUE is involved earliest in the infiltrating type. The bases of the broad ligaments, the utero-sacral ligaments, and the cellular tissue between the bladder and uterus are all affected but not always in the same order. As extension takes place, the pelvic viscera become fixed partly by the growth and partly by the inflammatory exudation which precedes its spread.

(4) THE BLADDER.—After invading the vesico-vaginal septum the growth attacks the base of the bladder. At first nodules of growth appear under the mucous membrane; later they destroy this membrane, and form an ulcerating mass which projects into the bladder. When this stage is reached blood and pus appear in the urine. The growth may break down and a vesico-vaginal fistula result.

SP. 3011.—*Carcinoma of the Cervix involving the Bladder.*

The specimen consists of the uterus with the appendages of the left side and the bladder. The lower part of the body, the cervix and upper part of the vagina are converted into a deep ulcer by the disintegration of an extensive carcinomatous growth. The walls of the ulcer are covered with flocculent shreds and sloughs. The growth has involved the vesico-vaginal septum, and appears in the cavity of the bladder, where its surface has the same flocculent appearance as in the vagina.

SP. 3002.—*Carcinoma of the Cervix producing a Vesico-vaginal Fistula.*

The specimen consists of the uterus, with its

appendages, the vagina and bladder. The growth has destroyed the cervix, the vesico-vaginal septum and the floor of the urethra, producing a large fistulous communication with ragged margins between the bladder and vagina. The lower part of the uterus and the vaginal walls are infiltrated by the growth.

(5) THE URETHRA.—The urethra is not often actually invaded by the growth, but may be compressed and the flow of urine obstructed.

(6) THE RECTUM is involved less frequently than the bladder. Recto-vaginal fistulæ may result from sloughing.

(7) THE PERITONEUM.—Nodules of growth appear on the peritoneum, especially over the bladder and in Douglas's pouch. General dissemination such as occurs with malignant ovarian tumours is rare.

(8) THE URETERS, BLOOD-VESSELS AND NERVES.—The ureters and blood-vessels are frequently obstructed in the late stages of the disease, but are rarely actually invaded. Intense pain may result from pressure upon the large nerve trunks.

(9) THE LYMPHATIC GLANDS.—The lymphatics from the cervix uteri pass to the following groups of glands:

(a) The iliac glands: These consist of a chain lying along the course of the internal iliac artery. The lowest is situated near the point of origin of the uterine artery, the highest at the bifurcation of the common iliac.

(b) The pre-sacral: A group situated on the anterior aspect of the sacrum.

(c) The utero-vaginal: One or more glands not constantly present in the parametrium near the crossing of the ureter and uterine artery.

(d) The lumbar glands, which form a chain in front or on either side of the abdominal aorta and vena cava inferior.

Any or all of these groups of glands may be affected in advanced cases, but glandular involvement is not a marked feature of the earlier stages of the disease. In some instances secondary deposits are found in the more distant groups of glands whilst those situated nearer the uterus escape.

(10) VISCERAL METASTASES are not common in carcinoma of the cervix. The lungs, liver and omentum are most commonly the sites of the deposits; the pleura, the heart, the kidney, the skin and bones less frequently so.

CHANGES IN THE BODY OF THE UTERUS IN ASSOCIATION WITH CARCINOMA OF THE CERVIX.

(i) HYPERTROPHY.—The wall of the uterus is often hypertrophied when the cervix is the site of a carcinomatous growth.

The endometrium also may show thickening. There is usually glandular hypertrophy and hyperplasia, whilst adenomatous polypoid growths may be found in the region of the fundus.

Hypertrophy of Fibro-muscular Tissue.

(See Sp. 3009A, 3006E, 3006C.)

Adenomatous Growth of the Endometrium.

(See Sp. 3004D.)

(ii) OCCLUSION OF THE CERVICAL CANAL.—The growth may obstruct the canal either by protruding into it, or involving its whole circumference. Hæmato-metra results, and when infection occurs, pyometra.

SP. 3007A.—*Carcinoma of Cervix and Pyometra.*

The right half of the uterus, and vagina, from a case of cancer of the cervix.

The growth has destroyed the portio vaginalis, leaving a ragged ulcer. It has extended into the vesico-vaginal and urethro-vaginal septum, and infiltrating the tissues of the cervix obstructed the cervical canal.

The walls of the uterus are thickened and the cavity dilated. In the recent state it was filled with pus.

(II) CARCINOMA OF THE BODY OF THE UTERUS.

The incidence of carcinoma of the body differs in important respects from that of the cervix :—

It is a rarer disease, constituting only 5 to 10 per cent. of uterine cancer.

It is relatively commoner in nulliparæ than in multiparæ.

It occurs later in life; the greatest number of cases are met with between the ages of fifty and sixty.

Three varieties may be distinguished :

(1) Columnar-celled carcinoma.

(2) Adenoma malignum.

(3) Squamous-celled carcinoma.

(1) COLUMNAR-CELLED VARIETY.—This occurs in (a) a circumscribed and (b) a diffuse form.

(a) In the circumscribed variety a definite tumour grows from some part of the mucosa lining the uterine cavity. The earliest appearances are of a number of papillary processes projecting into the cavity. The growth extends superficially towards the cavity and deeply in the uterine wall, and as it grows produces a rounded, soft, brain-like mass, covered with warty processes.

Microscopic appearances: There is a formation of new glands, arranged in groups separated from one another by connective-tissue septa. At first the new glands are lined with columnar or cubical epithelium resembling that of the normal glands, but soon the epithelium becomes many-layered and irregular. Papillary processes project into the gland lumina or invade the stroma, giving the appearance of solid columns of cells. As these changes progress the cells gradually change their shape and the glandular arrangement is entirely lost, so that the growth assumes the character of a spheroidal-celled carcinoma.

The tissues of the uterine wall are invaded and destroyed by the spread of the growth, whilst the older parts of the tumour undergo degeneration and disintegration.

SP. 3011A.—*Circumscribed Carcinoma of the Body of the Uterus.*

A uterus laid open to display a circumscribed growth springing from the wall and projecting into

and filling the cavity. The surface of the growth is rough and ulcerated. The adjoining endometrium appears healthy.

Microscopic examination.—The growth consists mainly of irregular spheroidal cells invading a fibrous tissue stroma, but in parts an arrangement of glandular acini, lined with cubical epithelium, can be made out.

SP. 3010c.—*A Uterus laid open longitudinally to show a Circumscribed Carcinomatous Growth.*

The growth, which is of circular outline, rough and verrucose, springs mainly from the body, but partly also from the cervix. The endometrium passes smoothly on to the margin of the growth, as though the latter had originated in the deeper parts of the mucosa and ulcerated through into the cavity. A number of similar but smaller tumours grow from the mucous membrane of the body. The largest of these is ulcerated.

Microscopic examination.—The growth is a columnar-celled carcinoma, showing a glandular arrangement.

(b) THE DIFFUSE VARIETY is commoner than the circumscribed. The whole endometrium of the body appears to be affected simultaneously and becomes converted into a rough, friable mass covered with papillary processes. The growth destroys and infiltrates the walls so that the uterus may consist of a mere shell of the fibro-muscular wall enclosing a large cancerous mass. The uterus is evenly enlarged

or becomes globular. The muscular wall may be thickened by infiltration. On section the distinction between the soft yellow growth inside and the red uterine muscle outside is clearly seen.

Degeneration leads to destruction of the central part of the growth; a crater-like cavity with sloughing, friable walls results.

The growth seldom spreads downwards below the level of the os internum, and consequently the cervix is usually free from disease.

The microscopic appearances are identical with those of the circumscribed variety.

SP. 3010B.—*Half of a Uterus showing Carcinoma of the Body.*

The organ is uniformly enlarged, partly by hypertrophy of its walls and partly by a carcinomatous growth, which involves the whole mucosa of the body and penetrates into the surrounding fibro-muscular tissue. The growth has a dead white appearance on section, and is clearly marked off from the uterine wall on one side, but on the other invades the muscle bundles. The free surface of the growth is ragged and covered with polypoid and papillary processes.

Microscopic examination.—The growth is a spheroidal-celled carcinoma. The sections show no glandular elements.

(2) ADENOMA MALIGNUM is a rare type of columnar-celled carcinoma, occurring usually in the body, but sometimes also in the cervix. The whole

mucosa is thickened, but without definite tumour formation, though polypoid excrescences may project into the cavity. The glandular tissue penetrates into the muscular wall and may reach the peritoneal surface. On section the growth presents a porous appearance. Extension beyond the uterus is long deferred, and consequently the prognosis after hysterectomy is good.

Microscopic appearance: The growth is composed of glands lined by a single layer of columnar epithelium. The glands are packed closely together with only a small amount of connective-tissue stroma. At first they preserve the appearance of the parallel tubes found in the normal mucosa of the body, but later become tortuous and dilated. The recognised proofs of malignancy, namely, anaplasia and destruction of tissues, are absent in the earlier stages, and a diagnosis is reached only by observing that the glands penetrate unusually far into the muscular wall.

Late in the course of the disease the growth approaches in appearance the type of columnar-celled carcinoma. Solid masses, composed of cells of a spheroidal form, are found infiltrating the connective tissue.

(3) SQUAMOUS-CELLED CARCINOMA OF THE BODY.—A few undoubted cases of this condition have been recorded. The growth originates in the squamous epithelium which sometimes lines the uterine cavity in elderly women.

On microscopical examination the appearances are those described under squamous-celled carcinoma of

the cervix. Cell-nests may be present in considerable numbers.

Occasionally in cases of columnar-celled carcinoma the form of the cells may change so that they resemble closely cells of the squamous type. Such instances of epithelial metaplasia should not be regarded as squamous-celled carcinomata of the body.

SPREAD OF CARCINOMA OF THE BODY.

Carcinoma of the body remains longer confined to the uterus, and consequently the prognosis after operation is more favourable than in carcinoma of the cervix. As has been mentioned already, the cancer destroys the uterine walls without grossly altering the shape of the organ. Ultimately the growth is surrounded by only a thin shell of the fibro-muscular tissue. This shell may be broken through and nodules of growth appear beneath the peritoneum. The peritoneal nodules may be directly continuous with the main growth, or may be of the nature of metastases and reach the peritoneum through the lymphatics.

THE PARAMETRIUM becomes involved both by direct extension of the growth and by lymphatic invasion.

THE LYMPHATIC GLANDS.—Most of the lymphatics from the body of the uterus run in company with the ovarian vessels and reach the lumbar glands; some pass to the inguinal glands along the course of the round ligament or to the iliac glands along the branches of the uterine vessels. All these glands may contain cancerous growths.

PERITONEUM.—Multiple nodules of growth are

found studding the surface of the abdominal viscera and parietal peritoneum in the late stages of the disease.

METASTASES most commonly occur in the lungs, liver, pleura and vagina.

SP. 3010.—*Perforation of the Uterus by Carcinoma of the Body.*

The right half of a uterus greatly enlarged by a diffuse carcinomatous growth but without marked change of shape. The peritoneum is roughened from inflammation; in front and behind the insertion of the Fallopian tube are two irregular areas with a papillary surface, where the growth has perforated the serous coat. The cut surface shows a diffuse growth involving the whole mucosa to within half an inch of the os externum, and deeply invading the uterine wall. The growth has a honeycombed appearance on section, and the part lining the uterine cavity is rough and covered with warty processes and fine, flocculent sloughs. The growth is a spheroidal-celled carcinoma.

SP. 3012.—*A Uterus and its Appendages.*

The uterus has been laid open from the back to show a carcinoma of the body. The cavity is lined by a rough, ulcerating growth, which has invaded the uterine wall. At the left cornu of the uterus the growth has perforated the wall and broken down; the fistulous communication between the cavity of the uterus and the peritoneum was closed by adhesions.

III. SARCOMA OF THE UTERUS.

As compared with carcinoma of the uterus sarcoma is a rare affection. It occurs at all ages, from infancy onwards, but is commonest about the time of the menopause. The body is involved more often than the cervix. The growth may originate—

- (a) In the uterine tissues, or
- (b) In the tissues of a fibromyoma.

Sarcoma of the body may arise in either the mucosa or fibro-muscular wall. In either case it may be of the circumscribed or diffuse variety.

A. IN THE UTERINE TISSUES.

(1) CIRCUMSCRIBED SARCOMA OF THE MUCOSA in its earlier stages appears as a rounded tumour resembling a mucous polypus, which, as it grows, fills and distends the uterine cavity. It is not encapsuled, but by the naked eye a clear distinction can sometimes be recognised between the tissues of the tumour and those of the uterine wall. When it commences in the deeper layers of the membrane the superficial portion of the mucosa covering the tumour may long remain intact, but eventually is destroyed by ulceration or by protrusion of the growth through it. On section the tumour is white, soft, and friable, the blood-channels are large and numerous, and hæmorrhages are often seen.

SP. 3011B.—*Section of a Uterus showing a Sarcomatous Growth in its Cavity.*

The organ is enlarged and the body is nearly globular. The growth springs from the fundus and fills the cavity, but does not extend beyond the os

internum. At its attachment to the uterine wall it is opaque, white, and homogeneous; further away hæmorrhage has occurred into its substance, and the lower part is degenerate. From a patient aged 66.

The growth is a round-celled sarcoma, and probably arose from the mucosa.

(2) **DIFFUSE SARCOMA OF THE MUCOSA** usually commences near the fundus, but may involve the whole endometrium as far as the os internum. The growth does not often extend to the cervix. The mucosa is thickened and roughened from the presence of polypoid and watery outgrowths. In colour it is greyish-white or light pink. It is soft, friable, and liberally supplied with blood-channels. Ulceration occurs early, and the surface becomes ragged and covered with sloughs. The fibro-muscular wall is not as a rule much involved, but sometimes the growth extends deeply into it, and may even perforate the peritoneal covering. (No specimen.)

(3) **CIRCUMSCRIBED SARCOMA OF THE FIBRO-MUSCULAR WALL** is much commoner than the diffuse variety. It produces a rounded tumour resembling a rapidly growing fibromyoma. On section it is more homogeneous and is without the whorled appearance characteristic of the fibromyomata. The tumours may be multiple and tend to become subperitoneal or submucous. They possess no capsule, but are more or less clearly marked off from the surrounding uterine tissue, and can sometimes be shelled out. Their colour is pink or white, but often obscured by extravasation of blood. Cysts may be present as

the result of tissue dégeneration. The submucous specimens cannot always be differentiated from the polypoid sarcomata of the endometrium.

SP. 3015A₁.—*The Left Half of a Uterus containing a Large Mass of Sarcomatous Growth.*

The growth is confined to the posterior wall of the uterus, which is greatly thickened. The main mass of the growth is dense and white, but extending along the cervical canal is a soft portion infiltrated with blood.

MICROSCOPIC EXAMINATION.—The growth is a spindle-celled sarcoma.

(4) DIFFUSE SARCOMA OF THE FIBRO-MUSCULAR WALL differs from the circumscribed variety in that it is not sharply marked off from the surrounding uterine tissue.

Histologically the uterine sarcomata are of the round, spindle, or mixed-celled varieties. Scattered giant cells are usually present; but tumours composed mainly of such cells are rare.

SP. 3015A.—*A Uterus with a Sarcomatous Growth.*

The body of the uterus is enlarged and globular. On the cut surface a growth is seen occupying the fundus. It extends throughout the whole thickness of the uterine wall, projects into the cavity, and perforates the peritoneum. The external surface of the uterus is roughened by adhesions and raised in bosses by the portions of the growth, which have in some places perforated the peritoneum. In the recent state the growth was red, soft, and vascular.

SARCOMA OF THE CERVIX.

(i) SARCOMA BOTRYOIDES (grape sarcoma).—This is a special variety of sarcoma which grows from the lower part of the cervical mucosa. It is composed of a solid core of sarcomatous tissue covered with branching processes and polypoid masses, often translucent and resembling grapes. The name is derived from this appearance. The translucent portions are not the result of myxomatous degeneration, but of infiltration with lymph-like fluid. Small cartilaginous nodules may be present. The surface of the tumour is everywhere covered with epithelium derived from the cervix, and is either stratified, squamous or columnar. Necrosis and infection of the mass protruding into the vagina occur early and lead to loss of the epithelial covering.

Histologically the tumour may be round, spindle, or mixed-celled. Giant cells and cartilaginous tissue are often present. The grape-like bodies consist of a very loose fibro-cellular tissue, with fluid between its meshes.

SP. 3009c.—*Grape Sarcoma of the Cervix.*

A large tumour removed from the anterior lip of the cervix uteri. It occupied and greatly distended the vagina. The central part of the mass is composed of a firm whitish tissue; from it spring a number of branching processes, many of which exhibit semi-translucent cyst-like dilatations. In the recent state some of these were as large as a cherry, and the mass resembled a bunch of grapes. Some

of the smaller cysts spring directly from the surface of the larger ones. In the lower part of the mass there is a considerable extravasation of blood.

MICROSCOPIC EXAMINATION.—The central mass is a spindle-celled sarcoma. The swollen grape-like bodies are much less cellular, and resemble loose fibrous tissue in a condition of extreme œdema. They are covered with stratified squamous epithelium.

(ii) POLYPOID SARCOMA. — A rapidly growing, rounded tumour, with a pedicle attached in the cervical canal or sometimes to the portio vaginalis, occupies the vagina. At first it is covered by cervical mucosa, but this covering is soon lost by ulceration and necrosis. Extravasations of blood and areas of degeneration are found in the substance of the tumour.

SP. 3015c.—*A Sarcoma of the Anterior Lip of the Cervix of a Girl, aged 17.*

The growth consists of a solid core, showing a few small cystic spaces on its cut surface, and covered by closely set polypoid processes.

MICROSCOPIC EXAMINATION.—The growth is a myxochondro-sarcoma.

SPREAD OF SARCOMA OF THE UTERUS.

As in the case of carcinoma, sarcoma of the cervix is disseminated more rapidly than sarcoma of the body. In all cases, however, secondary growths occur early. They are found in the lymphatic glands, lungs, liver, peritoneum, pleura, and other organs.

The primary growth may by its spread obstruct the ureters, urethra, or even the rectum.

B. SARCOMA ORIGINATING IN A FIBROMYOMA.

The relation of sarcomata to fibromyomata has been discussed in the section dealing with fibromyomata.

The sarcomata which originate in fibromyomata are probably derived from both the fibrous and muscular elements of these tumours. In some cases it is possible to observe all stages of transition between the fibro-muscular elements and sarcoma cells.

SP. 3015A₃.—*The Left Half of a Uterus, showing a Sarcomatous Growth originating in a Fibromyoma.*

The organ is enlarged and presents on its peritoneal aspect a number of bosses due to subperitoneal fibromyomata. At the lowest part of the specimen is the cervix uteri, dilated and patulous; the supra-vaginal portion is stretched to a length of $2\frac{1}{4}$ inches. The greater part of the specimen is composed of a group of tumours growing in the anterior wall of the uterus. At the lower part of the section is the uterine cavity dilated and occupied by a fibroid polypus. The axis of the cavity is almost at right angles to that of the cervical canal. The walls of the uterus are hypertrophied and contain several interstitial tumours. Of these the uppermost consist of dense white tissue. Below this is a large mass composed of similar tissue interspersed with a

brownish friable material, closely resembling blood-clot. The whole mass is encapsuled. Although the white fibromyomatous tissue has been extensively invaded the uterine wall appears to be free from growth.

Microscopic examination shows that the dense white tumours are fibromyomata, whilst the brown friable tissue is a mixed-celled sarcoma containing giant cells.

IV. CHORION-EPITHELIOMA.

Chorion-epithelioma is a malignant new growth of the epithelium covering the chorionic villus. It is composed of groups of Langhan's cells and masses of syncytium; it invades and destroys the walls of the uterus, infiltrates surrounding structures, and gives rise to metastases in distant parts of the body.

Ætiology.—In the vast majority of cases the growth supervenes upon a recent pregnancy. It is most common after vesicular mole, next most common after miscarriage, and least common after full-term pregnancy. In the rare instances in which the growth has occurred in virgins and in men it has had its origin in the tissues of a teratoma. Although the primary growth is usually situated in the uterus, it has been found in the vagina, vulva, Fallopian tube and ovary. In normal pregnancy portions of syncytium and Langhan's cells may be carried from the placental site to distant organs by the blood-stream, and it is probable that growths primary in situations other than the uterus arise from such detached portions. The interval between the ter-

mination of the pregnancy and the onset of symptoms varies from two or three weeks to several months.

NAKED-EYE APPEARANCES.—In the earlier stages the uterus is but little increased in size, and a small nodule of growth, sometimes of a deep red colour, is seen in the uterine wall (Sp. 3014B and 3014c). Later the uterus is enlarged, partly by growth of the tumour and partly by distension from retained blood-clot. The growth is most often seen in the form of an ulcer with a ragged base and raised everted edges (Sp. 3015), less frequently as a necrotic irregular mass projecting from the wall (Sp. 3014).

MICROSCOPICAL APPEARANCES.—The growth is composed of masses and strands of multinucleated protoplasm—the syncytium—and groups of spheroidal cells, with vesicular nuclei derived from the cells of Langhan's layer. There is no stroma between the groups of cells other than such portions of the uterine wall as have been invaded but not yet destroyed. The tumour possesses no well-formed blood-vessels, but is permeated throughout by vascular channels without definite walls, thus resembling in its general characters the sarcomata rather than the carcinomata.

SECONDARY GROWTHS.—The growth invades the systemic blood-vessels, and portions become detached and carried by the blood-stream to distant parts of the body. The commonest sites of the secondary growths are the vagina, vulva, and the lungs, but they have been found in almost every organ of the body.

Chorion-epithelioma is often associated with an excess of lutein-tissue in the ovary. The ovaries may contain multiple cysts, with thin walls, lined by a layer of yellow lutein cells (Sp. 3014 and 3015).

SP. 3014.—*A Uterus and Vagina from a Case of Chorion-Epithelioma.*

The vagina is united to the cervix by sutures. The uterus is much enlarged, measuring 6 inches in length; it has been laid open in front, exposing a large ragged mass of growth in its walls. The uterine wall is $1\frac{1}{3}$ inches in thickness, and the growth extends downwards, nearly reaching the internal os. The cervix is apparently free from disease. The internal surface of the uterus is rough and nodular, and a round mass of growth projects into the cavity from the posterior wall. In the right upper angle the growth is ulcerated and sloughing. Many large blood-vessels are present in the uterine wall. The vagina at its lower end is infiltrated with rounded masses of new growth having an ulcerated and ragged surface. Both ovaries are enlarged and cystic. The cysts are unilocular, with smooth walls and coagulated contents. The peritoneal surface of the uterus and appendages is covered with flakes of lymph.

MICROSCOPIC EXAMINATION.—The growth is a chorion-epithelioma with well-marked syncytial masses. The cysts in the ovaries are lined by a layer of lutein cells.

From a woman aged 23 who had borne three children. Fifteen months before death she was delivered of a vesicular mole, and from that time

suffered from hæmorrhage from the vagina and failing health. For the last six months an increasing swelling was present in the vagina. Pulmonary symptoms supervened, and the patient died from septic infection. Post mortem, pus was found in the peritoneal and right pleural cavities, and the lungs contained many secondary growths.

Note.—This is probably the oldest specimen of chorion-epithelioma in existence, and had been in the museum for more than thirty years before its nature was recognised.

SP. 3014A.—*A Uterus divided by a Coronal Section.*

The mucous membrane is thickened, and there is a small hæmorrhagic area near the fundus. Otherwise the appearances are natural.

Microscopic examination shows that the uterine muscle contains chorionic epithelial structures at a considerable depth from the surface.

Removed by operation from a woman aged 24 who had borne two children. She was delivered of a hydatidiform mole on June 23rd, 1906, and remained well until August 8th, when hæmorrhage recommenced. On September 21st the uterus was explored, and a round nodule consisting of blood-clot containing syncytial structures was removed. Vaginal hysterectomy was performed three days later.

SP. 3014B.—*Half a Uterus which has been Divided by a Median Section to Show a Growth in the Posterior Wall.*

The growth is of a deep purple colour, and

encroaches upon the cavity. It is crossed a little above the centre by a broad band of uterine muscle. The cervical canal is dilated, but the os internum is closed.

Microscopic examination shows that the growth is composed of masses of syncytium and groups of Langhan's cells embedded in blood-clot.

SP. 3014c.—*A Uterus, the Anterior Wall of which has been Removed to Show a Chorion-Epithelioma.*

The walls of the uterus are thickened and the cavity dilated. The cervical canal is patent. Immediately above the os internum is a rounded nodule of growth, deep-red in colour, and closely resembling blood-clot. The tumour has invaded the uterine wall on the left side, and by subsequent growth has encroached upon the cavity.

Microscopic examination shows that the growth is composed of Langhan's cells and syncytium. The left ovary showed great overgrowth of lutein tissue.

SP. 3015 — *A Uterus, the Posterior Wall of which has been Removed to Show a Syncytial Malignant Growth.*

The cavity is dilated, and during life was occupied by blood, both fluid and clotted. The cervical canal easily permits the passage of a large probe. The walls of the uterus are hypertrophied. On the inner surface of the anterior wall is an ulcer with a ragged base and raised, everted edges. On the wall of the uterus near the fundus there is a smaller area of ulceration presenting similar characters. Both

ovaries are enlarged, and contain cysts filled with a gelatinous material deeply stained by blood.

MICROSCOPIC EXAMINATION.—A section taken through the edge of the ulcer shows that the wall of the uterus is infiltrated by masses of multinucleate syncytium, and cells resembling those of Langhan's layer of the chorionic epithelium. Sections of the ovary show large quantities of lutein tissue in the ovarian stroma. The disease followed a hydatidiform molar pregnancy.

IV.

DISEASES OF THE FALLOPIAN TUBE.

SALPINGITIS.

INFLAMMATORY processes seldom effect the Fallopian tubes without involving also the ovaries and pelvic peritoneum. The inflammatory process may have its origin in the tube or may extend to it from neighbouring organs. Primary salpingitis is usually tuberculous, and will be considered separately. Secondary salpingitis is most often a sequel of infective endometritis of gonorrhœal or septic origin. Less frequently it is secondary to appendicitis, a suppurating ovarian cyst or other varieties of pelvic inflammation.

The pathological appearances differ according to the intensity and duration of the inflammation. We shall therefore describe—

- (a) Acute salpingitis.
- (b) Chronic salpingitis.

(a) ACUTE SALPINGITIS.

In acute salpingitis the inflammatory process affects first the mucosa lining the tube. The infection spreads by continuity from the mucosa of the uterus

to that of the tube, and not by leakage of infective material through the uterine ostium.

The deeper layers of the mucosa are infiltrated with small round cells. The plicæ are swollen, the epithelium is shed in places, and adhesions may form between the denuded surfaces of adjacent plicæ. In the cyst-like spaces thus produced (the sub-plical spaces) fluid may accumulate. To this variety the term "salpingitis pseudo-follicularis" is applied. In other cases no adhesions form, but the plicæ are shortened and thickened. The underlying muscular and fibrous tissues of the tube-wall share in the process. They are infiltrated with small round cells, and in consequence the tube becomes longer and thicker. The peritoneum covering the tube is reddened, injected, and covered with flakes of lymph.

Sp. 3094c.—*Acute Salpingitis.*

The uterus, tubes and ovaries from a woman who died of septic peritonitis following labour. The uterus is normal in size. A few flakes of lymph adhere to the peritoneum. There is a small abscess cavity in the right broad ligament. The ovaries are enlarged and covered with lymph. The cut surface shows intense hæmorrhagic engorgement of the cortex with hæmorrhage into the follicles. In the right ovary is a single small abscess; in the left two similar foci. The Fallopian tubes are markedly injected. The fimbriæ are swollen and red. Flakes of lymph are attached to them. The ampullary portion of the right tube is thickened. Elsewhere the normal contour and thickness of the tubes persists.

(b) CHRONIC SALPINGITIS.

Two main varieties may be distinguished :

(1) Without cyst formation ; (2) with cyst formation.

(1) WITHOUT CYST FORMATION.—In cases of long standing the organs present a characteristic appearance. The tube-wall is thickened by the formation of fibrous tissue and, to a less extent, by hypertrophy of the muscle. The muscle bundles are often separated by masses of newly formed fibrous tissue. The thickening is irregular, and does not affect all parts of the tube equally. These changes are accompanied by an increase in the length of the tube, and since this increase is not shared by the mesosalpinx, the tube is coiled upon itself. The abdominal ostium is closed by adhesion of the fimbriæ. Peritoneal adhesions fix the several coils of the tube to one another, and the whole tube adheres to the ovary, the uterus, and other viscera. In some instances small collections of serum or pus are found in the wall of the tube and between adjacent folds.

SP. 2953.—*Chronic Salpingitis.*

A uterus with its appendages showing pelvic inflammation. The fundus uteri is drawn over to the left side by the contraction of adhesions. On either side the appendages form a considerable mass, and are matted together by adhesions. The tubes are irregular, thickened and tortuous, but are not distended with pus. The fimbriated extremities are buried in adhesions.

(2) WITH CYST FORMATION.—Cyst formation results from considerable accumulation of fluid in a tube whose ostia are closed. Such cysts are classified into :

Hydrosalpinx ;

Pyosalpinx ;

Hæmatosalpinx, according as the contained fluid is serum, pus, or blood.

HYDROSALPINX.

We have seen that as the result of inflammation the abdominal ostium of the tube may be closed by adhesion of the fimbriæ to one another. The lumen of that portion of the tube which traverses the uterine wall may also be occluded by swelling of the mucosa. If under these conditions serous fluid is exuded from the inflamed mucosa the tube will become distended by the pent-up fluid. To a tube in this condition the name "hydrosalpinx" is given. A hydrosalpinx has the shape of a retort with a convoluted delivery tube, the head of the retort corresponding to the infundibulum, the most distensible portion of the tube ; the delivery tube corresponds to the ampulla and the isthmus. The sectional area of the dilated tube diminishes progressively as we pass from the infundibulum to the interstitial portion. The site of the abdominal ostium is often marked by a dimple on the distal portion of the tumour. The walls are thinned, stretched, and often translucent. On their inner aspect they are smooth, the plicæ of the mucosa are atrophied and flattened from the pressure of the

contained fluid, the epithelium lining the lumen is cubical or flattened, and in extreme cases may be entirely absent. The cyst may be divided into loculi by septa springing from the walls or by fibrous bands which constrict the lumen. A hydrosalpinx may become adherent to a cystic ovary and the partition between them give way. A single tumour is thus formed, known as a tubo-ovarian cyst.

SP. 2935.—*Hydrosalpinx*.

A hydrosalpinx distended and dried. The tube contained over half a pint of clear fluid. Note the length and tortuosity of the tube and the characteristic dilatation of the distal part to form a sac separated by a narrow neck from the rest of the tumour.

SP. 2937B.—*Bilateral Hydrosalpinx*.

The pelvic organs from a case of hydrosalpinx. In front are seen the bladder and part of the vagina; behind, the rectum; laterally, the pelvic peritoneum and cellular tissue. In the cavity so bounded lie the uterus and its appendages. The uterus is joined to the rectum by a narrow band of adhesion which divides the pouch of Douglas into two lateral halves. A few tags of fibrous tissue, evidence of past peritonitis, are attached to the uterus. The Fallopian tubes lie one in each half of the pouch of Douglas. They are elongated, tortuous and dilated, especially at the distal end, where the characteristic sacculatation is clearly seen (*cf.* Sp. 2936A and "Tubo-ovarian Cysts"; Sp. 2924B, 2937D, and 2924A).

PYOSALPINX.

In general appearance a pyosalpinx resembles a hydrosalpinx, but its walls are thicker and show more obvious evidence of inflammatory changes. The epithelium lining the cavity is often entirely lost, and the walls are lined by granulation tissue. The contents are purulent, but in cases of long standing may be sterile.

Sp. 2936c.—*Pyosalpinx*.

The Fallopian tubes and ovaries from a case of double pyosalpinx. The tubes are roughened by peritoneal adhesions, and show dilated blood-vessels and extravasations of blood. The ovaries are closely adherent to the tube and contain numerous cysts. The walls of the tubes are thickened and their lumina distended with inspissated pus.

Sp. 2936d.

Part of a uterus and its appendages showing double pyosalpinx. The body of the uterus has been amputated above the os internum. The Fallopian tubes are elongated, tortuous and distended with pus, forming two large tumours, one on either side of the uterus. The ovaries, which cannot be identified, are incorporated in these masses (see also Sp. 2936B).

HÆMATOSALPINX.

The Fallopian tube may be found distended with blood in a variety of conditions:—

(1) In tubal pregnancy (see Sp. 3072D and 3072E).

(2) As the result of torsion of the pedicle of a hydrosalpinx.

SP. 2937.—*Torsion of the Pedicle of a Hydrosalpinx.*

A Fallopian tube in a condition of hydrosalpinx with its corresponding ovary. Torsion has occurred near the uterine attachment of the tube. The tube is dilated and everywhere of a dark red colour from the effusion of blood in its walls. The ovary is enlarged and infiltrated with blood.

(3) In some cases of salpingitis.

(4) Occasionally in association with fibromyomata of the uterus.

SP. 2934A.—*Hæmatosalpinx.*

A uterus and Fallopian tube. The uterus is enlarged by multiple fibromyomata. The abdominal ostium of the Fallopian tube is closed and its lumen distended with blood. The adhesions seen about the tube and on the external aspect of the uterus are evidence of past inflammation.

Other cystic swellings are occasionally found in association with the Fallopian tube :

(1) Hydrosalpinx of an accessory tube.

(2) Cystic hydatids of Morgagni.

(3) Cysts due to dilatation of lymphatic spaces.

(4) Echinococcus cysts.

SP. 2915B.—*Cystic Hydatids of Morgagni.*

A portion of a dermoid cyst with the Fallopian tube. The Fallopian tube has two accessory ostia. Several pedunculated cysts are attached near the

main and accessory ostia. They are probably cystic hydatids of Morgagni.

SP. 2934.

Two ovaries with their Fallopian tubes. A thin-walled cyst which contains a transparent fluid is connected with each Fallopian tube near its extremity, but does not communicate with its canal.

SP. 2934c.

The outer end of a Fallopian tube to which is attached a cyst. The tube shows evidence of old inflammation. A sessile cyst is attached near the fimbriated extremity. A pedunculated cyst whose stalk measures 2 inches in length is also attached to the tube. A small piece of omentum is adherent to this cyst. The sessile cyst is probably a dilated lymph space and the pedunculated cyst a hydatid of Morgagni.

TUBERCULOUS SALPINGITIS.

Tuberculous infections of the Fallopian tube may be primary or secondary. It is difficult to prove that the tube is the site of the primary infection because of the possibility of overlooking small foci of tuberculous disease of other parts of the body. Secondary tuberculous infections of the tubes are not uncommon, 10 per cent. of the patients dying of tuberculosis show lesions in the tubes. The bacilli may reach the tube by the blood-stream, by direct extension from neighbouring organs, or from the uterus. The mucous membrane is first affected

and tubercles with typical giant-cell systems are found in the sub-epithelial tissue. The epithelium is shed, and as caseation advances the tubal lumen is filled with caseous material and mucus. The process extends until the fibro-muscular wall is thickened, nodular, and tortuous. Masses of caseous matter are seen in the wall, and serve to distinguish tuberculous from other varieties of purulent salpingitis. The abdominal ostium is usually closed and the peritoneal surface inflamed and studded with tubercles. The disease is almost always bilateral, and the ovaries are usually involved early.

SP. 2938.—*Tuberculous Salpingitis.*

The uterus and appendages from a woman who died of general tuberculosis. The uterus has been laid open and shows a small pedunculated fibroid on its anterior surface. Both Fallopian tubes are irregularly thickened in their outer halves. On the left side the fimbriæ are swollen and adherent to one another near their bases; on the right side the ostium is nearly closed by adhesions. The tubes have been laid open longitudinally and show extensive masses of caseous matter filling their lumina and lying in their walls.

SP. 2938A.

Two specimens of tuberculous disease of the Fallopian tubes. In the upper specimen the right ovary, with its Fallopian tube and broad ligament, is alone preserved. The Fallopian tube is thickened

enlarged, and filled with caseating material. The ovary contains a similar mass.

In the lower specimen the uterus and its appendages are preserved. The Fallopian tubes, greatly distended, are filled with caseous material and thick, cheesy pus.

On microscopic examination tubercle bacilli were discovered in the tube wall.

SP. 2938B.

Sections of two ovaries and Fallopian tubes affected with tuberculosis. In the lower of the two specimens the tube and ovary are matted together and covered with adhesions. The tube is very tortuous, its walls are thickened, and the lumen filled with caseous matter. The ovary contains a large caseous deposit, and towards one side is an oval cavity filled with blood-clot. This is probably a corpus luteum. The upper specimen shows similar but more advanced changes.

SOLID TUMOURS OF THE FALLOPIAN TUBE.

Solid tumours of the tube are rare ; they may be innocent or malignant.

Amongst innocent tumours papillomata (see Sp. 2913B), fibromata, enchondromata, and dermoids have been described.

The malignant growths are primary and secondary carcinoma, sarcoma, and chorion-epithelioma.

The only specimen of a malignant tumour of the tube in the museum is a primary carcinoma.

SP. 2938G.—*Carcinoma of the Fallopian Tube.*

A Fallopian tube showing a carcinomatous growth. The tube is distended, and has been laid open to display a soft warty growth springing from the mucous membrane.

MICROSCOPIC EXAMINATION.—The growth is a columnar-celled carcinoma.

V.

THE OVARY.

ANATOMY AND PHYSIOLOGY.

THE position which the ovaries occupy in the pelvis is variable, but each usually lies in a shallow depression, "the fossa ovarica," situated between the external and internal iliac arteries close to the bifurcation of the common iliac. The long axis of the organ corresponds with that of the body. Each ovary possesses two surfaces, two poles, and two borders. The surfaces are an external or lateral in contact with the fossa ovarica, and an internal or median directed towards the pelvic cavity; the poles an upper or pelvic, to which is attached the infundibulo-pelvic or suspensory ligament passing to the pelvic wall; and a lower or uterine, to which is attached the ovarian ligament connecting the ovary to the posterior and lateral aspect of the uterus a short distance below the insertion of the Fallopian tube. The margins are an anterior, nearly straight, and a posterior, convex. The anterior margin or hilum is attached to the posterior fold of the broad ligament by the mesovarium, and through it blood-vessels, nerves, and lymphatics reach the organ. The posterior margin is free and directed towards the rectum. The Fallopian tube occupies the uppermost part of the broad ligament, and runs outwards from

the uterus towards the side wall of the pelvis. It crosses in front of the hilum of the ovary to reach its external surface, and finally turns downwards upon its posterior free border. The longest of the fimbriæ, the fimbria ovarica, is attached to the inferior pole of the ovary.

The ovary is not entirely covered with peritoneum as are the free surfaces of the other abdominal viscera. The peritoneal folds forming the mesovarium extend only a short distance on the surface of the organ, which for the greater part is covered with a single layer of cubical epithelium, known as the germinal epithelium of Waldeyer. The line of junction between the peritoneum and the germinal epithelium is visible to the naked eye, and is known as the white line of Farre.

HISTOLOGY.—The stroma of the ovary consists of spindle-shaped connective-tissue cells of the embryonic type. It is condensed immediately beneath the epithelium, covering the surface of the organ to form a capsule—the tunica albuginea. The gland is divided into a cortex and medulla. The cortex or oöphoron contains the primordial and Graafian follicles with their contained ova. The medulla is composed of a more loosely woven tissue, containing, besides the spindle-cells above mentioned, unstriped muscle-fibres, the larger branches of the blood-vessels, and the tubes of the rete ovarii. It is continuous with the connective tissue of the mesovarium, and so with that of the broad ligament.

The epithelial structures found in the ovary consist of:—

(1) The surface epithelium (the germinal epithelium of Waldeyer).

(2) The germ-tubes.

(3) The medullary cords.

(4) The rete ovarii.

These four structures are derived from the primordial germinal epithelium. The epithelium covering the Wolffian body at the site of the future sex gland proliferates, and becomes broken into irregular masses by the up-growth of the underlying connective tissue. The gland or ovary, as it may now be called, consists of a stroma and a covering of epithelium; from the under-surface of the latter finger-like processes dip down through the stroma towards the hilum or attached portion of the gland.

The cells about the middle of these processes become differentiated, some forming oögonia or immature ova, whilst others line the primitive follicles in which the oögonia lie. The deeper parts of the processes persist to form the medullary cords, and at their distal extremities acquire lumina to form tubules lined with columnar ciliated epithelium, situated in the hilum of the ovary and known as the rete ovarii. Some of these tubules are continuous with the tubules of the epoöphoron, a structure to be described with the broad ligament. The derivatives of the primitive epithelium are therefore :

(1) THE SURFACE OR GERMINAL EPITHELIUM, the superficial layer of the primitive epithelium covering the gland. It consists of a single layer of cubical cells.

(2) THE GERM-TUBES, the middle portions of the

finger-like processes from which are formed the ova and their follicles.

(3) THE MEDULLARY CORDS, the undifferentiated portion of the finger-like processes deep to the germ-tubes.

(4) THE RETE OVARIUM, the collection of tubular structures arising from the termination of the processes, and situated in the hilum of the ovary.

There is therefore a continuous succession of epithelial elements extending from the surface of the ovary through its substance to the hilum.

THE BROAD LIGAMENT.

The broad ligament is a fold of peritoneum stretching from the side wall of the pelvis to the side of the uterus. It presents a free superior margin, whilst below it is continuous with the peritoneum covering the floor of the pelvis, and mesially with that covering the uterus. When the outer end of the Fallopian tube is raised up three folds or ridges appear on the ligament. The middle one is the ridge formed by the Fallopian tube, behind and below this one formed by the ovary and its ligaments, and in front and below that formed by the round ligament.

Between the two peritoneal folds, in addition to the structures just mentioned, lie the ovarian artery, running immediately below the Fallopian tube, the uterine artery in the base of the ligament, a plexus of veins, lymphatics and nerves, and lastly, the epoöphoron, parovarium or organ of Rosenmüller.

The parovarium consists of a variable number of vertical tubules lined with columnar ciliated epithe-

lium, which open into a horizontal duct situated a short distance below the Fallopian tube, and terminating blindly in the broad ligament. This horizontal tube is called the duct of Gärtner, and represents the remains of the Wolffian duct.

THE GRAAFIAN FOLLICLE.

At birth the cortex forms the greater part of the ovary and contains a large number of ova lying in what are called "primordial follicles." In the human race it is probable that no new ova are formed after birth. From the primordial follicles Graafian follicles develop. Before puberty Graafian follicles ripen without the discharge of ova.

The fully formed Graafian follicle may attain a diameter of 15 millimetres. It consists of a connective-tissue wall, the theca folliculi, divided into two layers, the tunica externa, consisting of condensed ovarian stroma, and the tunica interna, a vascular structure in which the stroma cells are more rounded and larger than elsewhere. Inside the theca folliculi is the epithelial lining or membrana granulosa consisting of several layers of polygonal cells which rest upon a structureless membrane, the "membrana propria." At one point, usually on the side towards the medulla, this layer is raised into a pyramidal mass of cells called the "discus proligerus" in which the ovum is embedded.

After puberty the follicles, as they ripen, rupture, and the ova are discharged into the peritoneal cavity. They are guided into the Fallopian tube

by the activity of the ciliated epithelium which covers its fimbriated extremity and lines its lumen.

As the follicle ripens the ovary becomes congested with blood, the tension in the follicle increases, and the supply of blood to its most superficial part is cut off. An area of necrosis is thus formed, and weakens the wall sufficiently to allow of rupture at this point. The ovum escapes and with it the liquor folliculi and cells of the membrana granulosa. The intra-follicular pressure is reduced and hæmorrhage occurs into the follicle from the vessels of the tunica interna. From this time onwards the follicle is known as the corpus luteum.

THE CORPUS LUTEUM.

At first the corpus luteum consists only of blood-clot. About the time of rupture the cells of the theca interna undergo changes to form lutein cells. These are large cells with a relatively small nucleus; their protoplasm stains faintly with eosin, and contains a pale yellow pigment belonging to the class of bodies known as lipochromes. These cells increase in number and form a broad lamina lining the cavity of the follicle. The lamina is folded in and out in a characteristic wavy manner.

Vascular loops grow into the blood-clot from the tissues surrounding the corpus luteum. Leucocytes migrate from them, and invading the clot disintegrate it.

SP. 2908E₁.

The specimen shows a corpus luteum in an enlarged

ovary. Hæmorrhage has occurred into the cavity of the follicle. The clot is invaded by lutein cells. The lutein layer is thrown into wavy folds.

Ultimately the lutein cells undergo hyaline degeneration. The cells of the stroma invade the hyaline mass and eventually completely replace the corpus luteum. The corpus luteum of menstruation is often called "false," while that of pregnancy is called "true." There is no foundation for this distinction, but the corpus luteum of pregnancy continues to grow larger than that of menstruation because of the increased blood supply which accompanies pregnancy; it attains its maximum diameter about the fifth month.

One function of the corpus luteum is to effect the absorption of the clot resulting from the rupture of the follicle without leaving a scar. Lately it has been suggested that the corpus luteum presides over the embedding of the ovum in the decidua. This theory is supported by the greater size of the corpus luteum of pregnancy and by the fact that an excess of lutein tissue is found with hydatidiform moles and chorion-epitheliomata, in both of which conditions there is a great overgrowth of the trophoblast. It is further suggested that in the absence of impregnation the corpus luteum furnishes an internal secretion which determines the onset of menstruation.

INFLAMMATION OF THE OVARY.

(A) ACUTE OÖPHORITIS.

(1) PERI-OÖPHORITIS.—In this variety the surface is

mainly affected. The cells of the surface epithelium are lost, the gland is covered with lymph, and fixed by adhesions to neighbouring viscera. The tunica albuginea is thickened. Small round-celled infiltration is found in the superficial parts of the cortex.

(2) ACUTE PARENCHYMATOUS OÖPHORITIS is usually associated with the exanthemata and toxic conditions generally. The chief changes occur in the Graafian follicles. The cells of the membrana granulosa degenerate. The ovum dies and eventually disappears. The liquor folliculi becomes thick and turbid. The surrounding stroma is infiltrated with small round cells (Sp. 3094c).

(3) ACUTE DIFFUSE OÖPHORITIS.—The lesions described under this heading are usually the result of infection with the gonococcus or the pyogenic organisms. There is a diffuse round-celled infiltration of the stroma, and foci of suppuration may be found in the Graafian follicles, the corpora lutea and the stroma. Localised abscesses are formed. The abscesses may coalesce by destruction of the intervening ovarian tissue and the whole gland be converted into a sac of pus (Sp. 2951E).

(B) CHRONIC OÖPHORITIS.

Chronic oöphoritis is frequently a sequel of the acute form, but may arise without severe symptoms. The gland may be of normal size, smaller than usual, or enlarged. In most cases it is fixed to the surrounding structures by adhesions the result of peri-oöphoritis, but ultimately the mobility of the gland may be to a greater or less extent restored through

absorption of the adhesions. On section the tunica albuginea is thickened, the follicles are small and shrunken with thickened fibrous walls, or may be cystic. The ovum perishes, the cells of the membrana granulosa disappear, and the corpora lutea are small and show hyaline changes. The stroma is infiltrated with small round cells and contains areas of newly formed fibrous tissue.

SP. 2908D.—*The Appendages of the Right Side showing Chronic Inflammation.*

The ovary is natural in size but nearly globular, and covered with dense adhesions. It contains several follicles; one larger than the others is filled with blood-clot. The stroma of the gland is dense and fibrous.

SP. 2903A—*Chronic Oöphoritis with Hyperplasia.*

The uterine appendages of the right side showing chronic inflammation. The Fallopian tube is elongated, thickened and covered with adhesions. The ovary is enlarged and contains a unilocular cyst at its outer extremity. Its surface is smooth except for a few flakes of lymph. The stroma is dense and fibrous. The uterus contained large fibromyomata.

SP. 2903B.

An ovary enlarged and covered by adhesions. There are numerous cysts about the size of peas immediately beneath the surface. Bands of fibrous tissue are seen on the cut surface, and between them areas of tissue having a porous appearance.

(See also Sp. 2952B, 2952 and 2953.)

CIRRHOSIS AND SCLEROCYSTIC DISEASE OF THE OVARY.

These conditions are sometimes regarded as late results of oöphoritis, but their inflammatory origin is not definitely proved. The ovaries are small, dense, and shrunken, except when enlarged from the presence of follicular cysts. The surface is smooth, and shows no adhesions; the stroma is dense and fibrous with areas of hyaline degeneration, and the follicles are absent or converted into cysts with clear watery contents.

SP. 2903.—*Sections of Two Ovaries showing Cirrhosis.*

They are shrunken, their stroma is dense and fibrous, and the tunica albuginea is thickened. Their external surface is smooth, and shows no signs of peri-oöphoritis. From a woman aged 35, who had ceased to menstruate two years before death.

SP. 2906.—*A Pair of Ovaries, Small and Shrunken, with Puckered Surfaces.*

They contain numerous shrivelled corpora lutea and a few dilated follicles. From a woman aged 42, who had ceased to menstruate three years before her death.

HÆMORRHAGE INTO THE OVARY.

Hæmorrhage may occur into the interior of the ovary in a variety of pathological conditions :

(1) Hæmorrhage into an ovarian tumour as a result of torsion of its pedicle (see p. 261, Sp. 2937a).

(2) Hæmorrhage into the interior of a malignant tumour, solid or cystic (see p. 255, Sp. 2926).

(3) Hæmorrhage due to rupture of the sac of an ovarian gestation (no specimen).

(4) Hæmorrhage occurring in the course of septicæmia, the hæmorrhagic form of the acute specific fevers or other varieties of toxic poisoning (see p. 204, Sp. 3094c).

(5) Hæmorrhage into the Graafian follicles in cases of chronic oöphoritis and sclerocystic disease (Sp. 2938B).

(6) Hæmatoma of the ovary (Sp. 2910B).

HÆMATOMA OF THE OVARY.

The hæmorrhage may be limited to the Graafian follicles, or may be diffused throughout the stroma. In follicular hæmorrhages the extravasation of blood commences in the vascular theca interna of the developing Graafian follicle, or more rarely in the tissues of the corpus luteum. One or more follicles may be affected. The effused blood is at first bounded externally by the stroma and internally by the membrana granulosa. As more blood is effused the membrana granulosa gives way, and the blood collects in and distends the follicle cavity, which is thus converted into a blood-cyst. Extravasations into the stroma occur simultaneously, and eventually a tumour may be produced the size of an orange. Such a tumour almost invariably contracts adhesions to adjacent peritoneal surfaces. On section we find a central cavity containing viscid chocolate-coloured blood surrounded by a capsule of stretched and expanded ovarian tissue. The inner wall is usually rough, and rounded cords are often seen stretching across the cavity. Such cords represent the remains of septa between the

original follicles, and are evidence of the original multilocular nature of the tumour. The condition is sometimes unilateral, but more often bilateral. Little is known of the cause of the disease; it has been found associated with uterine fibroids, as in Sp. 2910A, with tuberculous peritonitis, and with septic infections of the Fallopian tube following labour. In the diffuse form there is no definite cyst formation, but the whole ovary is enlarged and infiltrated with blood. The formation of a diffuse hæmatoma is often attended by very acute symptoms.

SP. 2910A.—*Hæmatoma of the Ovary and Fibroids.*

Half of the uterus and the right ovary. The uterus contains interstitial and subperitoneal fibroids. The ovary and tube are matted together and their surface is covered with shaggy adhesions. The ovary is enlarged to the size of a golf-ball and is converted into a thick-walled cyst, which in the recent state was filled with dark fluid blood. The lining of the cyst is stained with blood-pigments.

SP. 2910B.

An ovary enlarged by the presence of a smooth-walled cavity. In the recent state the cavity was filled with old but still fluid blood. The peritoneal surface is pitted and roughened, and has fragments of blood-clot adherent to it.

Microscopic examination of the cyst-wall shows the normal stroma of the ovary. There is no evidence of ovarian gestation.

The patient was a single woman aged 26, who had suffered for some weeks with severe pain in the abdomen.

TUMOURS OF THE OVARY AND BROAD LIGAMENT.

TUMOURS of the ovary and broad ligament constitute an important group of new growths of epithelial and connective-tissue origin. Our knowledge of the development of these tumours is at present incomplete, and a strictly scientific classification is impossible. The chief members of the group may be provisionally classified as follows :

(1) CYSTS DERIVED FROM GRAAFIAN FOLLICLE :

(a) Distension cysts.

(b) Lutein cysts.

(2) CYST-ADENOMATA :

(a) Pseudo-mucinous.

(b) Serous.

(3) OVARIAN PAPILLOMATA :

(a) Papillomatous cysts.

(b) Surface papillomata.

(4) OVARIAN TERATOMATA :

(a) Cystic ("Dermoids").

(b) Solid teratomata.

(5) TUBO-OVARIAN CYSTS.

(6) BROAD LIGAMENT CYSTS.

(7) SOLID INNOCENT TUMOURS OF THE OVARY :

- (a) Fibromata.
- (b) Fibro-adenomata.
- (c) Myomata.
- (d) Fibro-myomata.

(8) MALIGNANT TUMOURS :

- (a) Carcinomata.
- (b) Sarcomata.
- (c) Chorion-epitheliomata.

(1) CYSTS OF THE GRAAFIAN FOLLICLE.

(a) Follicular distension cysts are formed by distension of the Graafian follicles. They are formed both before and after puberty. In size they rarely exceed one inch in diameter. They are unilocular and contain no intra-cystic growths. Their wall consists of a layer of condensed ovarian stroma lined by a single layer of columnar epithelium resting on a basement membrane.

The contents are clear, watery, albuminous fluid, sometimes discoloured by blood pigments.

SP. 2904c.—*Follicular Cysts.*

An ovary, Fallopian tube, and part of the broad ligament. The ovary contains one large cyst, 1 inch in diameter, and several smaller ones. The cysts are unilocular and contain no intra-cystic growths. (See also Sp. 2903B.)

ROKITANSKI'S TUMOUR.

When many Graafian follicles undergo cystic change, and the ovarian stroma is represented only by narrow trabeculæ separating the various cysts, the tumour so formed is known as "Rokitanski's Tumour" (Sp. 2908).

(b) LUTEIN CYSTS.

Lutein cysts are distinguished by the presence of a layer of yellow lutein tissue in their walls. They are usually multiple, and in 90 per cent. of the cases both ovaries are affected. The individual cysts are seldom larger than a golf ball, but from the presence of a number of such cysts the ovary may form a considerable tumour. In some cases the walls are thin and almost translucent, in others thick and opaque. The contents may be jelly-like or consist of clear, limpid fluid.

MICROSCOPICAL EXAMINATION.—The outer layer of the wall is composed of modified ovarian stroma, the inner layer often possesses a wavy appearance and contains the lutein tissue. Some of the cysts possess a lining of epithelial cells, in others this is absent. When present, the epithelium consists of a single row of cells, cylindrical, cubical, or polyhedral, resting upon the lutein stratum. When there is no epithelial layer the cyst is lined by structureless fibrinous material, probably representing the hypertrophied membrane propria of the Graafian follicle.

PATHOLOGY.—As far as we know, lutein cysts are always associated with a recent pregnancy, and are

usually found in connection with certain abnormal conditions, viz. vesicular mole and chorion-epithelioma. In both of these conditions there is marked development of the tissues derived from the trophoblast (the syncytium and Langhans cells), and it has been suggested that these lesions may in some way result from the excessive production of lutein tissue in the ovary. Such a causal relationship is by no means proved, and it may be that some stimulus, at present unknown, leads simultaneously to hyperplasia of the trophoblast in the uterus and the lutein tissue in the ovary.

The life of the lutein cell is a brief one, and, where the expulsion of a vesicular mole is not followed by the development of a chorion-epithelioma, the ovary enlarged by lutein cysts may gradually shrink until it again reaches its normal size.

SP. 3014.—*Lutein Cysts.*

The uterus, appendages, and vagina from a case of chorion-epithelioma following hydatidiform mole. The ovaries are enlarged. The right measures 3 inches in length and contains several cysts the size of walnuts. The cyst cavities are filled with a jelly-like material (clear in the recent state). The left ovary contains several small cysts similar to those in the right, and one large one, only part of which is preserved. Its walls are held apart by a glass rod.

MICROSCOPICAL EXAMINATION.—The cyst-wall is composed of ovarian stroma, lined by a layer of lutein cells.

SP. 3015.—*The Uterus and Appendages from a case of Chorion-epithelioma following Hydatidiform Mole.*

The ovaries are enlarged and contain cysts filled with a gelatinous blood-stained material.

MICROSCOPIC EXAMINATION.—The cyst-wall consists of condensed ovarian stroma, lined by a thick layer of lutein cells.

(2) CYSTADENOMA.

Two varieties of cystadenoma are recognised :

(a) Pseudo-mucinous.

(b) Serous.

(a) PSEUDO-MUCINOUS CYSTADENOMA.

This is the commonest variety of ovarian tumour met with clinically. It consists of a number of loculi and may attain enormous proportions. It occurs at all ages. The surface is pearly-white except where the wall has been much thinned, when it is translucent. It is irregular, marked by bosses formed by the constituent loculi, and large blood-vessels ramify over it. The pedicle is formed by the broad ligament and the structures contained between its two layers. The Fallopian tube sometimes stretches over the surface of the tumour and is greatly elongated (Sp. 2904A). The fimbria ovarica is always attached to the surface of the cyst.

On section the tumour consists of a mass of cysts of all sizes bounded by trabeculae of fibrous tissue.

The size of the loculi varies greatly, so that some tumours have a honeycombed appearance due to the close packing of many small cysts (Sp. 2904K), while others consist of one large cavity. In this case the evidence that the tumour was originally multilocular is afforded by the presence of imperfect septa or thickenings of the supporting tissue projecting into the cavity of the cyst (Sp. 2908B), and by the presence of microscopic cysts in the wall of the main tumour.

MICROSCOPICAL EXAMINATION.—The cyst is covered by the ovarian surface epithelium, but this is lost when the cyst becomes large. The wall consists of an outer firm layer of fibrous tissue and an inner looser layer resembling the stroma of the ovary. The cavity is lined by tall columnar epithelium which secretes pseudo-mucin. The smaller cysts found in the inner fibrous layer of the wall are lined by the same kind of epithelium as the larger ones. Intracystic growths, also covered with columnar epithelium, are sometimes found projecting into the cavity of the cysts (proliferating glandular cysts).

The fluid contained in pseudo-mucinous cysts varies in its character. It is usually thinner in the large, and thicker in the smaller loculi. The specific gravity ranges between 1010 and 1030. The colour depends upon the amount of admixture with blood pigments, and varies from pale yellow to deep brown. The fluid contains albumen and pseudo-mucin, a substance which differs from mucin in that it is not precipitated from watery solutions by acetic acid.

SP. 2904B.—*Pseudomucinous Cystadenoma.*

Part of a cystadenoma which has been divided to show the interior. The external surface is smooth and white, and is crossed by the outer end of the Fallopian tube. On the internal surface many small cysts are seen projecting into the main cavity.

SP. 2904A.—*A portion of a Cystadenoma.*

The specimen consists of a large loculus, attached to whose walls are many smaller loculi.

SP. 2904K.—*Part of a Cystadenoma which weighed 25 lbs.*

It is composed of a multitude of small cysts containing a glairy fluid. The fluid has become opaque in the process of hardening.

SP. 2913E.—*A specimen closely resembling the last.*

It has burrowed between the layers of the broad ligament.

SP. 2904P.—*Part of a Multilocular Cystadenoma of the Ovary.*

The tumour is divided by numerous trabeculae into cystic spaces containing colloidal material. Some of the cavities show very minute intra-cystic growths.

MICROSCOPICAL EXAMINATION.—The stroma is composed of connective tissue resembling that of the ovary. The cystic cavities are lined by flattened epithelium.

(b) SEROUS CYSTADENOMATA.

Are much rarer tumours; they are pedunculated and multilocular, but usually contain only a few loculi. They differ from pseudo-mucinous tumours in two respects: (1) They are lined by tall columnar cells possessing well-marked cilia. (2) Their contents consist of clear watery fluid containing albumen, but no pseudo-mucin.

(3) OVARIAN PAPILLOMATA.

Papillomatous growths of the ovary form 10 per cent. of ovarian tumours. They occur in two forms—*(a)* as a cyst containing papillary growths (Sp. 2913A₂); *(b)* as papillomata growing from the surface of the ovary (Sp. 2913B). Both types of growth are sometimes met with in the same specimen (Sp. 2913C).

PAPILLOMATOUS CYSTS differ in important respects from the cystadenomata just described. The main points of difference may be summarised as follows:

- (i) They are usually bilateral.
- (ii) They contain papillomatous masses, pedunculated or sessile, varying in size from a millet seed to an orange. If the cyst-wall ruptures they become distributed over the peritoneal cavity, and give rise to implantation growths.
- (iii) They show a marked tendency to burrow between the two layers of the broad ligament.

- (iv) They are usually unilocular, or contain only a small number of loculi.
- (v) They seldom attain a size greater than a man's head.
- (vi) Their contents are clear serous fluid.
- (vii) Their epithelial lining is often polymorphous.
- (viii) Psammoma bodies are common in both the epithelial and connective tissues.
- (ix) The wall is dead white, smooth and rounded, and not marked by the numerous bosses seen in the cystadenomata.

MICROSCOPICAL EXAMINATION.—The wall consists of an outer dense layer of connective tissue in which unstripped muscle-fibres and, in the smaller cysts, traces of the ovarian stroma are sometimes found. Inside this is a layer of looser, more cellular, connective tissue, lined by epithelium resting on a basement membrane. The epithelium may be columnar or cubical, and is sometimes ciliated. The cells are usually arranged in a single layer, but in the smaller cysts there may be two or three layers.

The papillomata are composed of a core of loose connective tissue resembling that of ovary, covered by a layer of columnar or cubical cells. Psammoma bodies occur in both the epithelium and the stroma. They consist of masses of calcareous matter, varying in size from microscopic objects to bodies the size of a millet seed.

THE SURFACE PAPILLOMATA are single or multiple growths springing from the surface of the ovary. They may be sessile or pedunculated. An ovary

affected with these growths may show little change in its interior or may contain cysts.

MICROSCOPICAL EXAMINATION.—The papillomata consist of a vascular connective-tissue core, continuous with the stroma of the ovary, and covered by a layer of columnar epithelium which is often ciliated.

DISSEMINATION.—Solid growths on the walls of ovarian cysts may be papillomata or carcinomata. In the case of the innocent tumours, from rupture of the cyst, from penetration of the wall by the growth or because they arise from the surface of the ovary, papillomata may be found on the outside of the tumour. In these cases portions of the papillomata break off and become disseminated in the peritoneal cavity, causing ascites. Some of these adhere to the abdominal viscera, grow and form what are known as “implantation” growths, but they do not invade or destroy the tissues upon which they are implanted. The life of such growths is short, so that if the primary tumour is removed they wither away, and no new ones appear; the peritoneum regains its normal appearance, and the ascitic fluid is reabsorbed. Ovarian carcinomata also give rise to secondary growths similar in their appearance, but such growths invade and destroy the tissues upon which they are implanted, and do not disappear after removal of the primary tumour.

SP. 2913A₂.—*A papillomatous cyst.*

The cyst is unilocular, and measures six inches by four. Externally the tumour is smooth, rounded, and crossed by the Fallopian tube. The fimbria

ovarica is attached to the cyst wall. From the inner surface of the wall numerous papillary growths of varying shape and size are seen projecting into the cavity of the cyst.

SP. 2913c.—*Papillomatous cysts of both Ovaries.*

The ovaries are enlarged and cystic. The cysts contain papillomatous growths. The bulk of the specimen consists of exuberant papillomatous masses growing from the surface of the cyst and ovary, and projecting into the peritoneal cavity.

SP. 2913D.—*The specimen consists of two Cysts and a Mass of Papillomatous Growth.*

One cyst is unruptured; the other shows a rent $2\frac{1}{2}$ inches in length. The rent was found at the operation. In the lower part of the specimen is a mass of surface papillomata.

(See also Sp. 2913A₁, 2921, and 2913A₃.)

SP. 2913B.—*Surface Papilloma.*

The ovary is entirely hidden by a mass of compound papillomatous growths springing from its surface. They form a tumour 3 inches in length. The Fallopian tube shows papillomatous growths springing from its mucous membrane.

(4) OVARIAN TERATOMATA.

These form a group of tumours having the common characteristic that in them tissues are found more or less closely resembling the mature

tissues of the body. The component elements are derived from all three of the original germinal layers, epiblast, mesoblast, and hypoblast, but their arrangement is irregular, so that portions of such distant organs as intestine, trachea, and brain are found side by side.

The presence of representatives of the three germinal layers in the same tumour shows that teratoma can only be derived from a sex-cell. No explanation is forthcoming as to why a sex-cell should so divide and multiply atypically.

(a) TERATOMATOUS OVARIAN CYSTS.

A teratomatous ovarian cyst is composed of two parts—

- (1) An embryonal rudiment in which can be usually demonstrated tissues derived from all three layers of the blastoderm.
- (2) A cyst in which this rudiment is growing.
(See Specimens 2917E, 2917F, and 2917G.)

The tumours are usually unilateral, but occasionally bilateral, Sp. 2917c and D; they are commonly pedunculated, but may lie partially or completely between the layers of the broad ligament. In shape they are spherical, with a smooth glistening surface often of a yellow colour. The relation between the ovary and the tumour varies; most often the ovary is flattened and incorporated with the cyst-wall (Sp. 2917B); sometimes it forms a projection on the wall of the cyst (Sp. 2917F); very rarely the tumour is attached to the ovary by

a definite pedicle. Cystic teratomata are usually unilocular, but some are composed of two or more loculi. It is not uncommon to find a teratoma and a multilocular cystadenoma or papilloma, developing in the same ovary as in Specimens 2922B and 2915B. The cyst cavity is occupied by hair and by thick sebaceous matter containing fat globules and cholesterolin plates.

Ovarian tissue is usually to be found in the wall of the cyst, and often contains follicular cysts and corpora lutea as in Specimen 2917D. The wall is lined by skin in the immediate neighbourhood of the embryo (Specimens 2922B, 2920A, and 2917E), and it is in this part of the wall only that hair follicles are found. Throughout the rest of its extent the lining wall is smooth or covered by a dense granulation tissue, in which hairs and cholesterolin plates are embedded.

From one part of the wall a mass covered with skin often projects into the cyst cavity. This is the embryoma (Specimens 2917E, 2917F, 2917G). The skin which covers the protuberance extends for a short distance on to the walls of the cyst around its base. The embryoma does not always form a distinct eminence; it is sometimes flattened, compressed, and incorporated with the cyst wall (Specimen 2920A), but in these cases microscopical examination will usually reveal tissues derived from all these germinal layers. The embryoma consists sometimes mainly of skin and its appendages, sometimes of mucous membrane traversed by epithelium lined canals, and sometimes of tissues—epiblastic, meso-

blastic, and hypoblastic—which bear a close resemblance to those of the cephalic extremities of the embryo. Under the skin small flat plates of bone are often found, and beneath them a stratum of brain tissue. Occasionally well-formed limbs or portions of the trunk are found in the cyst.

STRUCTURES FOUND IN TERATOMATOUS CYSTS.

- (1) EPIBLASTIC.—Skin, sebaceous glands, teeth, nails, and nervous tissue are the commonest.
- (2) Mesoblastic structures are fibrous and fatty tissues, unstriped muscle, hyaline cartilage, and bone.
- (3) Hypoblastic structures are less often found. Thyroid gland, intestine, stomach, and trachea have been found in the specimens represented in this museum.

Teratomatous cysts are seen at all ages, but are commonest during the child-bearing years. They are usually slow growing, and seldom attain a large size. Occasionally the skin of the embryoma is the site of squamous-celled carcinoma.

SP. 2915A.—*Cystic Teratoma*.

A Fallopian tube, part of the broad ligament and ovary. A cyst occupies the position of the ovary. The fimbria ovarica is attached to it. Its walls are thick; the cavity contains hairs matted together with white sebaceous material.

SP. 2915B.—*A portion of a Cyst of the Left Ovary, measuring 5 inches in its long diameter.*

It has been laid open, and the semi-fluid contents removed. Attached to the inner wall of the sac are three smaller cysts, and lying among them two well-formed teeth. The distal end of the Fallopian tube is attached to the upper part of the cyst. Several of the fimbriæ have small cysts at their extremities. An accessory tube opens into the upper part of the Fallopian tube. The tumour is probably formed by the co-existence of a teratoma and a multilocular cyst adenoma.

SP. 2917E.—*A Cystic Teratoma measuring 4 inches in diameter.*

The Fallopian tube is seen on the outer side crossing the surface of the tumour. The fimbria ovarica is attached to it. The cavity is filled with brown hair, which grows from a rounded projection (the embryoma), covered with skin, and situated on the lower part of the cyst-wall.

SP. 2917F.—*A Cystic Teratoma 3 inches in diameter.*

At the upper part of the specimen the remains of the ovary can be seen, while the cyst lies below. A large projection, the embryoma, covered with skin, is attached to the wall of the cyst. A strand of hair grows from this projection. The Fallopian tube crosses the cyst in front of the remains of the ovary.

SP. 2915C.—*Bilateral Teratomata.*

A uterus with its appendages and a teratomatous

cyst growing from either ovary. The cysts are about 3 inches in diameter, and consist of several loculi. Hairs grow in their interior.

SP. 2917C and D.—*The Ovaries from a case of Bilateral Teratomata.*

The larger specimen shows an unusually large embryoma. In the smaller specimen the ovary is moderately enlarged, and contains beside the teratoma a corpus luteum and several follicular cysts.

SP. 2914.—*Bones and Teeth from Teratomatous Cysts.*

A piece of bone like the alveolar margin of the mandible which contained an incisor and two molar teeth. The incisor and one molar have fallen from their sockets, and lie in the bottom of the jar.

SP. 2917.—*Portion of the Wall of a Teratomatous Cyst.*

Several well-formed teeth are seen growing from it.

SP. 2917B.—*Portion of the Wall of a Teratomatous Cyst which has been turned inside out.*

Four teeth are seen projecting from it. One is incisor in type, one bicuspid, and two molar. They are fixed in a plate of bone imbedded in the cyst-wall. The extent of the bone can be made out by holding the specimen up to the light.

(b) SOLID TERATOMATA.

Although the proportions of solid and fluid material varies greatly in teratomata, there is a

class in which the solid portions form the main mass of the tumour. The tumours are known as the "solid teratomata." They differ from the cystic variety in that the embryo rudiment is not contained within a clearly defined cyst. On section the solid portion presents a variety of appearances, according to the tissue of which it is composed and the presence or absence of hæmorrhagic effusions. Cysts are always to be seen, but are usually small. They may be cysts of new formation or of degeneration. The solid teratomata are usually malignant, and recur very rapidly after removal. Sp. 2929D was removed from one of the few patients who have remained free from recurrence for two years.

SP. 2929D.—*Solid Teratoma.*

Half of a large solid teratoma. The growth is enclosed in a dense fibrous capsule, on the external surface of which may be seen the Fallopian tube and broad ligament. The fimbria ovarica is attached directly to the tumour. The cut surface shows a division into three main lobes. The lower lobe consists of a solid tissue, in which are many small cysts. Spicules of bone and cartilage are seen scattered throughout the tissue. The other lobes consist of a similar solid tissue, but contain some large cysts as well as small ones. The large cyst at the top of the specimen appears to have been formed by the disintegration of solid tissue.

Microscopical examination shows that the tumour is composed of elements derived from all three layers of the blastoderm without ordered arrangement.

SP. 2929C.—*Part of a Solid Teratoma (Malignant).*

The tumour consists of a solid stroma containing cysts, which vary in size from a pin's head to an orange. A thick fibrous capsule covers the tumour. A portion of the Fallopian tube is seen on the side of the specimen.

Recurrence took place within a month of removal.

MICROSCOPIC EXAMINATION.—The sections show bone, cartilage, cysts lined with squamous and columnar epithelium, glandular structures (including liver), myxomatous and fibrous tissue.

(5) TUBO-OVARIAN CYSTS.

When an ovarian cyst and a hydrosalpinx co-exist adhesions are frequently formed between them. The septum between the cyst and the dilated tube may be absorbed, and the resulting tumour is then known as a tubo-ovarian cyst. It is necessary to differentiate this condition from a much convoluted hydrosalpinx surrounding and obscuring the ovary, and from a hydrosalpinx with the ovary flattened out on its wall.

SP. 2936A.—*Hydrosalpinx adherent to an Ovarian Cyst.*

Part of the uterus with the appendages of the left side. On the back of the uterus are seen adhesions the result of past inflammation. The Fallopian tube is elongated, tortuous, and distended with clear fluid. The fimbriated end is closed, and the infundibulum is much dilated. The ovary is cystic, and

adherent to the distal part of the tube. There is as yet no communication between the distended tube and the ovarian cyst.

SP. 2924B.—A similar specimen.

SP. 2924C.—*Tubo-ovarian Cyst.*

A uterus with its appendages from a case of hydrosalpinx. The uterus is anteflexed, and the pouch of Douglas is occupied by the distended tubes, to which the ovaries are bound down by peritonic adhesions of long standing. The left tube adheres to an otherwise healthy ovary, and presents the usual characters of a hydrosalpinx. The right Fallopian tube encircles and adheres to the corresponding ovary, which contains a small bilocular cyst. The distended tube communicates with the ovarian cyst by an opening one third of an inch in diameter. The margins of the opening are irregular, and show the remains of the septum, which originally separated the cyst from the hydrosalpinx.

SP. 2937D.—*The Uterine Appendages of the left side showing a Tubo-ovarian Cyst.*

The Fallopian tube is moderately dilated, and communicates by an aperture about a quarter of an inch in diameter with an ovarian cyst. The ovary and tube are firmly adherent, and the line of junction between them is obscured by a thick layer of lymph. On the surface of the main cyst are two

smaller cysts. These may be either loculi belonging to the ovarian cyst, or collections of serous fluid pent up in the layer of lymph which covers the ovary.

SP. 2924_A.—*The Uterus and Appendages from a case of Tubo-ovarian Cyst.*

The uterus and the left appendages are normal. The right ovary is converted into a thin-walled cyst 5 inches in diameter. The ovarian ligament is attached to the cyst. The Fallopian tube is 9 inches in length, distended with clear fluid, and adherent throughout its outer half to the cyst. The fimbriæ cannot be distinguished. The tube and cyst communicate by an opening 2 inches in diameter.

(6) BROAD LIGAMENT CYSTS.

These cysts arise between the layers of the broad ligament, independently of the ovary. The majority have their origin in the parovarium, but hydro-salpinx of an accessory Fallopian tube or dilatation of lymphatic spaces may also produce a cystic tumour in this situation. Parovarian cysts arise from the tubules of the parovarium. As these tubules penetrate the hilum of the ovary for a varying distance, cysts of this type may be found in the ovary itself. They are usually single, and may attain an enormous size. The pedicle is broad and ill-defined, or may be entirely absent, the cyst burrowing into the pelvic cellular tissue, and stripping

up the peritoneum. The Fallopian tube, often greatly elongated, crosses the tumour. The fimbriæ are flattened out on its wall. The ovary is usually separate and distinct, and to it the ovarian fimbria is attached. When the ovary is flattened against the cyst-wall this relation of the fimbria is still preserved.

The contents consist of clear alkaline fluid containing but little albumen. On section the wall is composed of loose connective tissue, and contains unstriated muscle fibres. The lining consists of a single layer of columnar ciliated epithelium resting on a basement membrane. Papillary growths and masses composed of fine branching processes are frequently found growing from the inner surface of the cyst wall. Histologically the papillomata consist of a fibrous tissue core covered with epithelium similar to that lining the cavity.

SP. 2923.—*Parovarian Cyst*.

The appendages of the right side with a cyst of the broad ligament. The ovary is quite distinct from the cyst. The cyst measures about 5 inches by 4 inches. Its walls are thin and its lining membrane smooth. At the extremity nearest the ovary is a second smaller cyst. Each is situated between the layers of the broad ligament and is crossed by the Fallopian tube. The fimbriated end is expanded over the cyst. The fimbria ovarica can be traced to the ovary.

SP. 2923D.—*A Parovarian Cyst together with the Ovary, Tube, and part of the Broad Ligament.*

The cyst measures about 8 inches in diameter. Its cavity is studded with small warty growths, and on the outside is a pedunculated mass covered with similar growths. The Fallopian tube, much elongated, is curled over the cyst, a glass rod indicates its position. One of the fimbriæ ends on the mass of warty growth. The ovary is entirely distinct from the cyst.

SP. 2942C.—*A large Parovarian Cyst having the characters already described.*

The ovary is the site of a small teratomatous cyst.

(7) SOLID INNOCENT OVARIAN TUMOURS.

FIBROMATA OF THE OVARY.

We recognise three varieties:—

- (1) Fibroma in which the whole ovary is replaced by fibrous tissue.
- (2) Fibroma in which the growth arises from one part of the ovary, the rest of the organ being unaffected.
- (3) Pedunculated fibroma.

(1) IN THE FIRST GROUP THE OVARY IS COMPLETELY REPLACED BY FIBROUS TISSUE.—The surface of the tumour is dead white and smooth, but raised here and there into bosses. Such fibromata are frequently bilateral. The Fallopian tube is not stretched over

them, but the ovarian fimbria is attached to them. Ascites is a common concomitant. On section, the appearance is that of interlacing bundles of white fibrous tissue. On microscopic examination the tumour is found to consist of bands of fibrous tissue and spindle-cells resembling those of the ovarian stroma.

Degenerative changes leading to the formation of cystic spaces filled with mucinoid material are often found.

SP. 2925.—*Fibroma of the Ovary.*

The pelvic contents from a case of fibroma of the ovary. Connected with the back of the left broad ligament, at the point usually occupied by the ovary, is a spherical tumour $2\frac{1}{2}$ inches in diameter. The ovary cannot be made out apart from the tumour. The tumour has been divided mesially, but the cut surface is not visible, as both halves have been replaced in the position they originally occupied in Douglas's pouch. On the surface of the uterus are small subperitoneal fibroids. The right appendages are natural.

SP. 2925B.—*A large Fibroma of the Ovary.*

SP. 2925C.

This specimen has the general characters and relations of an ovarian fibroma, but the cut surface shows calcareous plates and spicules.

MICROSCOPICAL EXAMINATION.—The tumour is composed of fibrous tissue.

SP. 2927A.—*One half of a Fibrous Tumour of the Ovary containing Cystic Spaces.*

The cut surface shows at the lower part fibrous tissue. The cystic spaces vary in size; the largest has a window cut in its wall to display the cavity; its contents were a greenish alkaline fluid, coagulating spontaneously.

MICROSCOPICAL EXAMINATION.—The solid portions consist of connective tissue of the type of the ovarian stroma, but in every stage of development into pure fibrous tissue. The less dense portions are undergoing mucinoid degeneration, the first stages in the formation of cysts. The cysts have no epithelial lining.

(2) IN THE SECOND GROUP THE FIBROMA ARISES FROM PART OF THE OVARY.—The tumour develops in the ovary, displacing but not replacing the ovarian tissue. Sometimes it can be completely enucleated from the capsule of ovarian tissue which surrounds it. This variety is not usually accompanied by ascites.

SP. 2925A.—*A Fallopian Tube and Ovary from which is growing a Fibrous Tumour.*

From the lower part of the ovary as it lies in the jar projects a solid tumour measuring 3 inches by 2½ inches. The ovary and tumour share a common capsule. The cut surface of the tumour resembles that of a uterine fibroid.

MICROSCOPICAL EXAMINATION.—The tissue cannot be distinguished from the normal ovarian stroma.

(3) PEDUNCULATED FIBROMA. — Tumours of this group consist of pedunculated growths of fibrous tissue attached to the surface of the ovary. They probably arise in the tunica albuginea.

SP. 2937G.—*Pedunculated Fibroma.*

The uterine appendages of the left side, showing a large fibroma of the ovary. The fibroma is attached by a narrow pedicle. The natural appearances are obscured by torsion of the pedicle and broad ligament.

ADENO-FIBROMATA resemble the fibromata in general appearance, but contain cavities lined by low columnar epithelium.

MYOMA and FIBRO-MYOMATA are occasionally found in the ovary.

(8) MALIGNANT TUMOURS OF THE OVARY.

CARCINOMA of the ovary occurs both as a primary growth and in the form of secondary deposits from carcinomatous growths elsewhere.

PRIMARY CARCINOMA is found (1) as a solid growth of the ovary ; (2) as a growth arising in an ovarian cyst.

(1) The solid variety is found as an irregular rounded tumour, enclosed at first by the tunica albuginea. On section the appearances are very diverse. The tumour may be hard or soft, and shows in varying degree areas of fatty, caseous, and

myxomatous degeneration, hæmorrhages and cystic spaces containing a greenish colloidal material. The colour may be white (Sp. 2927D), yellow (2926A), red, dirty grey (2926B), or black (2927E). In size these tumours rarely exceed a man's head. They occur at all ages, are usually accompanied by ascites, and may be bilateral. True metastases are not a feature of the disease in its early stages, but implantation tumours on the peritoneum are frequent. The microscopic appearances are as diverse as the macroscopic.

Primary carcinoma is a less common affection than was formerly believed, for it is now recognised that a large ovarian carcinoma may be secondary to a small growth in the intestine or elsewhere.

SP. 2926A. *Columnar-celled Carcinoma.*

The specimen consists of an irregularly rounded mass 7 inches in diameter. The surface is bossed and covered with a smooth whitish membrane. The cut surface is a pale yellow colour, showing here and there black points due to small hæmorrhages. On one side, towards the lower part of the specimen, are a number of cystic cavities, which in the recent state contained an opaque greenish fluid.

MICROSCOPICAL EXAMINATION.—The growth is a columnar-celled carcinoma. The cysts are lined with columnar cells.

SP. 2926B.

A specimen closely resembling the last, except that the cavities in the lower part of the specimen

are due to degenerative changes. The growth is a columnar-celled carcinoma.

SP. 2927D.

A specimen also resembling 2926A. The cut surface, however, shows fibrous trabeculæ surrounding spaces filled with mucinoid material, the result of myxomatous degeneration. The growth is a columnar-celled carcinoma.

SP. 2927E.—*Bilateral Ovarian Carcinomata*.

The tumours are in each case solid and much lobulated on the surface. One of them has been divided, and shows that the growth consists of dense yellow tissue, containing areas of black pigmentation, with here and there cysts lined by a smooth membrane.

MICROSCOPICAL EXAMINATION.—The growths are spheroidal-celled carcinomata.

(2) THE CYSTIC VARIETY of carcinomata may arise from the acquisition of malignant characters by the epithelium of an ovarian cyst, usually of the pseudo-mucinous or papillomatous varieties, or may arise without the previous existence of an innocent tumour. The epithelium proliferates, becomes many layered, atypical, and invades the connective tissue stroma. True metastases are rare, implantation tumours and ascites common.

SP. 2926A₁.—*Carcinomatous Cyst*.

A portion of a large carcinomatous cyst. The

specimen is divided by a septum into two chambers of unequal size. From the inner aspect of the cyst-wall project large masses of solid growth, giving the specimen a nodular and warty appearance. The peritoneal surface of the cyst is intact, except at a spot near the fimbriated extremity of the Fallopian tube. Here the growth has involved the peritoneum and projects as a sessile velvety mass.

MICROSCOPICAL EXAMINATION.—The growth is composed of a fibrous stroma containing closely packed alveoli lined by cubical epithelium. In most cases the cubical epithelium is in a single layer, but here and there solid masses of cells are seen.

SECONDARY CARCINOMA of the ovary is not uncommon. The primary growth is usually in the breast, intestine, uterus, or opposite ovary. Under the microscope the appearances closely resemble those of the primary growth.

SP. 2929B.—*Secondary Carcinoma in the Ovary.*

An ovary infiltrated with colloid carcinoma. The specimen consists of a semitransparent, irregularly rounded mass, and its cut surface shows alveoli formed by strands of fibrous tissue enclosing a gelatinous material. A portion of the Fallopian tube is attached to the specimen. The primary growth was a colloid carcinoma of the stomach.

SP. 2927.—*A Uterus and its Appendages.*

The site of each ovary is occupied by a hard nodular tumour. One has been laid open and shows

a dense, hard, fibrous tissue containing a number of small cysts. The primary growth was in the mammary gland.

MICROSCOPICAL EXAMINATION.—The tumours are spheroidal-celled carcinomata.

SARCOMA OF THE OVARY.

Primary sarcoma of the ovary is less common than primary carcinoma. The growths are usually unilateral, but in 20 per cent. of the cases both organs are affected. The tumours differ in appearance according to the type of cell of which they are composed :

SPINDLE-CELLED SARCOMATA are usually hard, rounded, or nodular tumours with no distinct capsule. They occur in older women, and grow comparatively slowly.

ROUND-CELLED SARCOMATA are softer and often brain-like ; they are found in young subjects and grow with great rapidity.

In both varieties degenerative changes are common.

SP. 2927B.—*Primary Sarcoma of the Ovary.*

Half of one of a pair of bilateral ovarian tumours. The outer surface shows a vertical depression, in which is the cut end of the pedicle, and radiating from it are grooves dividing the rest of the specimen into irregular bosses. The cut surface shows that the tumour is solid, but contains a cavity, smooth-walled and spherical, filled in the recent state with clear mucoid fluid ; a second smaller cavity is also

seen. Strands of fibrous tissue are present in the central part of the growth, and hæmorrhagic areas towards the periphery.

MICROSCOPICAL EXAMINATION.—The tumour is a fibro-sarcoma, which has undergone extensive myxomatous degeneration. The section shows numerous vascular spaces, and around these the sarcoma cells are closely packed.

SP. 2926.—*Primary Sarcoma of the Ovary.*

Half of a large solid tumour of the ovary. On the outer surface is seen part of the Fallopian tube and the cut end of the pedicle. The rest of the outer surface is smooth and marked by sulci dividing rounded bosses. In the lower part of the specimen the growth has involved the serous covering of the tumour and projects through it. The cut surface is divided by a fibrous band into an upper and lower portion. The upper part contains necrotic, blood-stained material. The lower part is subdivided by fibrous trabeculæ, and contains homogeneous pul-taceous material stained here and there by extravasations of blood.

MICROSCOPICAL EXAMINATION.—The growth is a round-celled alveolar sarcoma.

SARCOMATOUS OVARIAN CYSTS.

Sarcoma is occasionally found in the walls of ovarian cysts. This may happen under two different conditions :—

(1) The central portion of an originally solid ovarian sarcoma may soften, degenerate, and be-

come diffuent; a wall of sarcomatous tissue may thus be left surrounding a cystic cavity.

(2) The connective tissue in the wall of a cyst-adenoma or cystic teratoma may show the atypical proliferation and destructive properties characteristic of malignant disease.

SP. 2927c.—*The wall of an Ovarian Tumour lined by a layer of Sarcoma Tissue.*

The outer wall of the tumour is smooth and is crossed by the Fallopian tube; the interior is occupied by a large cystic cavity lined by shaggy necrotic sarcoma tissue. The contents in the recent state appeared to be pure blood. Several large thrombosed vessels are partially exposed in the sarcoma tissue.

MICROSCOPICAL EXAMINATION.—The growth is a round-celled sarcoma.

SP. 2928.—*Secondary Sarcoma (Melanotic).*

The uterus and appendages of a young woman. Both ovaries contain rounded deposits of sarcoma, partly black and partly grey. Deposits of black material are also seen under the peritoneum covering the uterus. The patient died of melanotic sarcoma. The primary growth was in a mole on the back.

SP. 2927c₁.—*Chloroma.*

An ovary showing secondary infiltration with chloroma (green sarcoma). The gland is enlarged by a diffuse infiltration of its tissues with a greenish growth.

MICROSCOPIC EXAMINATION.—The growth is a small round-celled sarcoma.

The primary growth was apparently in the anterior part of the basis cranii.

PRIMARY CHORION-EPITHELIOMA OF THE OVARY may be met with under three conditions—(1) as a growth arising in an ovarian teratoma; (2) as a growth following a recent pregnancy, and probably arising from portions of foetal epiblast which have been carried to the ovary from the uterus by the blood stream; (3) as a growth following ovarian gestation.

COMPLICATIONS OCCURRING WITH OVARIAN TUMOURS.

1. PRESSURE SYMPTOMS.

(a) IN THE PELVIS.—The majority of ovarian tumours possess a pedicle, and are able to rise out of the pelvis when they become too large to be accommodated by it. Occasionally an ovarian tumour fails to rise into the abdominal cavity, because (1) it is growing between the two layers of the broad ligament, or (2) it becomes impacted beneath the promontory of the sacrum, or (3) it is fixed by adhesions to the floor of the pelvis. Under these circumstances pressure is exerted upon neighbouring organs, and may cause retention of urine or, more rarely, chronic intestinal obstruction.

(b) IN THE ABDOMEN.—A large ovarian cyst situated above the brim of the pelvis may, from its great size, interfere with the descent of the diaphragm and

cause difficulty in respiration ; it may interfere with the digestive organs or compress the abdominal veins, causing œdema of the legs. In some cases suppression of urine results from changes in the kidneys, caused either by pressure upon the ureters or by interference with the return of blood by the renal veins.

For specimens of large cysts see Nos. 2905, 2905A.

SP. 2916A.—*Impacted Ovarian Tumour which caused Retention of Urine.*

The pelvic organs showing an ovarian cyst impacted in the pelvis. A sagittal section has been made. In front is seen a small contracted bladder, behind this the vagina and uterus. The uterus is displaced to the left, and is elongated, measuring 5 inches from fundus to cervix. Behind the uterus and occupying Douglas's pouch, which is displaced downwards, is a multilocular dermoid cyst. The rectum lies behind and below the cyst. The left Fallopian tube is dilated and adherent to the cyst.

The patient woke up one morning unable to pass water. Three days later incontinence set in. The urine was drawn off with a catheter, but pyuria and sloughing of the mucous membrane of the bladder followed.

2. OBSTRUCTION TO DELIVERY.

An ovarian tumour may obstruct delivery either when it is fixed in the cavity of the pelvis, or when

free to move, it enters the pelvic strait in advance of the presenting part. In this case the presenting part, driven onwards by the uterine contractions, presses against the tumour, and filling the inlet prevents its return into the abdomen. The tumour, restrained from further advance by Douglas's pouch and the pelvic floor, prevents the passage of the foetus.

SP. 3091A.—Cf. *Obstructed Labour*. (See p. 71.)

3. HÆMORRHAGE INTO OVARIAN TUMOURS.

Hæmorrhage occurs into ovarian tumours as the result of torsion of the pedicle, of violence, or without any known external cause. Malignant ovarian tumours also commonly show blood extravasations. (See Specimen 2926.)

SP. 2909A.—*Hæmorrhage into Ovarian Cysts*.

Part of the wall of an ovarian cyst which is thickened by the presence of extravasated blood. (See also Specimens 2937G and 2904L₁.)

4. THROMBOSIS OF VEINS.

Thrombosis of veins may occur spontaneously, or may follow septic infection or torsion of the pedicle.

SP. 2904N.—*Thrombosis of Vessels*.

Part of the wall of an ovarian cyst showing numerous thrombosed vessels ramifying on the

inner surface. Extravasation of blood has occurred into the tissues adjoining the vessels. (See also Specimen 2927c.)

5. TORSION OF THE PEDICLE.

Torsion of the pedicle may be produced gradually or suddenly. The veins in the pedicle are more easily compressed than the arteries, and their lumina are first occluded. Blood still flows along the arteries, and the tumour becomes engorged. Blood is extravasated into the tissue of the tumour, and clotting occurs in both the vessels and the blood extravasated. If the twist is not spontaneously uncoiled or the tumour removed surgically, gangrene and fatal peritonitis sometimes ensue.

SP. 2904_L₁.—*Torsion of the Pedicle of an Ovarian Cyst.*

An ovarian cyst strangulated by torsion of its pedicle. The whole specimen is plum coloured. The cyst measures $5\frac{1}{2}$ by $4\frac{3}{4}$ inches. Its surface is smooth, opaque, and traversed by thrombosed bloodvessels, whilst its walls are thickened by extravasated blood. The broad ligament with the Fallopian tube is many times its natural size owing to engorgement of vessels and extravasation of blood. The cut surface shows the distribution of the thrombi. The pedicle is twisted on itself in a half turn. The torsion was originally more com-

plete, but the pedicle was untwisted at the operation. The fimbria ovarica is attached to the cyst.

SP. 2937E.—*The Uterine Appendages of the right side, showing a broad Ligament Cyst with Torsion of the Pedicle.*

The cyst is thin walled, unilocular, and situated between the layers of the broad ligament. The Fallopian tube is stretched over its surface. The infundibulum is elongated, and the fimbriæ are deeply congested. On the posterior aspect of the specimen is the ovary enlarged as the result of extensive blood extravasation into its stroma.

SP. 2937F.—*A Specimen similar to the last.*

SP. 2937G.—*Fibroma of the Ovary with Torsion of the Pedicle.*

The uterine appendages of the left side with a large fibroma of the ovary. Torsion of the broad ligament has occurred, and, as a result of venous obstruction, all the structures seen are swollen and coloured a deep red from extravasation of blood into their substance. In addition to the general engorgement, note the hæmatoma between the layers of the broad ligament.

6. RUPTURE.

Rupture may occur spontaneously or as the result of (a) external violence, (b) parturition, (c) intra-cystic hæmorrhage, or (d) perforation of the wall by intra-cystic growths.

The consequences depend (1) on the amount of the hæmorrhage attending the rupture; (2) on the nature of the contents which escape from the tumour. The fluid from cysts with serous contents is absorbed without difficulty, but that from the pseudo-mucinous variety is not absorbed, and unless the rent in the tumour closes continues to escape and gradually fills the peritoneal cavity. This condition is known as “pseudo-myxoma peritonei.” Pus from a suppurating cyst usually causes general peritonitis. The contents of teratomatous and papillomatous cysts may give rise to implantation tumours on the peritoneum.

SP. 3080.—*Rupture of a Cyst.*

A multilocular cyst of the ovary, showing at the lower part of the specimen an extensive tear. The margins of the tear are rough and shaggy. The cyst burst spontaneously during the fifth month of the patient's pregnancy, “causing intense pain with increasing vomiting and hiccup.” (See also Specimen 2913D.)

7. INFLAMMATION.

From slight degrees of torsion or from other causes ovarian tumours may become inflamed, and acquire adhesions to neighbouring viscera or to the abdominal walls. Occasionally, from torsion and atrophy of the pedicle, they become detached from their original blood supply, and are nourished by means of blood flowing to them through vessels in the adhesions. Organisms from the bowel or from a

neighbouring inflammatory focus, *e.g.* appendix or tube, may reach the tumour and cause suppuration. (Cf. Tubo-ovarian cysts.)

SP. 2910.—*Adhesion and Perforation.*

Part of the wall of an ovarian cyst which is adherent to a piece of intestine. The latter may be recognised by the presence of valvulæ conniventes. The peritoneal surfaces of both cyst and intestine are shaggy from the effects of old inflammation. Perforation of the adjacent portions has occurred. A glass rod has been placed in the hole. "Some weeks before death, after the discharge of a large quantity of fluid *per anum*, the abdominal tumour diminished in size, and the dulness to percussion over its region was replaced by tympanitic resonance."

8. DEGENERATION.

Fatty, myxomatous, calcareous, and other forms of degeneration are often seen in ovarian tumours.

SP. 2907.—*Calcareous Degeneration.*

An ovary and part of the Fallopian tube with the broad ligament. The ovary contains a small cyst, in the walls of which some deposits of calcareous matter can be made out.

SP. 2925c.—*A Calcifying Fibroma of the Ovary.*

The cut surfaces show numerous plaques and spicules of calcareous matter.

VI.

PELVIC INFLAMMATION.

PERI- and PARA-METRITIS.—The term “perimetritis” means inflammation of the pelvic peritoneum secondary to inflammation of the uterus and its appendages. “Parametritis” is the term applied to inflammation of the pelvic cellular tissue. The pelvic peritoneum and cellular tissue are in such close anatomical relationship that the one cannot be inflamed without the other sharing to some extent in the process.

PARAMETRITIS.

ÆTIOLOGY.—Inflammation of the pelvic cellular tissue may follow labour, abortion, or operations upon the uterus. Two factors are necessary. (1) The presence of pyogenic organisms; (2) some breach of surface through which they gain admission. In some instances the infective organisms are already present in the vagina, but usually they are introduced upon the fingers or instruments of the operator. The necessary breach of surface is often found in a laceration of the cervix or vagina

inflicted during the passage of the child or by the use of instruments. In the non-puerperal woman parametritis may follow operations upon the cervix, or may be secondary to an infective process in the pelvis, as, for example, a pyosalpinx or ulcerating malignant growth.

PATHOLOGICAL ANATOMY.—“The pelvic cellular tissue is not a special structure, but is a portion of a wide system of mesoblastic connective tissue which surrounds the great vessels of the trunk, accompanying their branches from origin to termination, and extending mainly in the form of peri-vascular sheaths to all parts of the body” (Anderson and Makins). In the pelvis the cellular tissue is situated between the peritoneum above and the strong pelvic fascia below, consequently all cellulitic effusions lie between these two structures. In some places, as over the fundus of the uterus, the fascia and peritoneum are in close contact with one another, and only a very thin layer of cellular tissue intervenes; in other places, especially around the supra-vaginal portion of the cervix uteri they are separated by a wide interval filled by a mass of cellular tissue. From this mass processes spread outwards into the bases of the broad ligaments, backwards into the utero-sacral ligaments, and forwards on either side of the bladder, and are directly continuous with the cellular tissue of the anterior abdominal wall and renal fossæ. Consequently it is round the cervix uteri that most cellulitic effusions have their origin.

During pregnancy the enlarging uterus draws up the broad ligament out of the pelvis, and the amount

of cellular tissue is increased to fill in the space which would otherwise exist. When infection occurs through a cervical laceration, an inflammatory exudate is poured out in the neighbouring cellular tissue, and as such injuries are usually inflicted by the occiput, the hardest part of the head, the effusion is most often situated on the left side. The exuded fluid coagulates and forms an indurated mass, which depresses the vaginal fornix of the affected side, displaces the uterus towards the opposite side of the pelvis, and passing forwards and upwards, reaches the iliac fossa and the anterior abdominal wall. On examination at this stage a dense induration is found to occupy half the pelvis, and to it the uterus is fixed. This pelvic induration is continuous with a broad band of induration felt in the anterior abdominal wall just above Poupart's ligament, and extending from near the anterior superior iliac spine towards or beyond the middle line. More rarely the inflammation spreads backwards instead of forwards, and produces an exudate in one or both utero-sacral ligaments, surrounding the rectum, and occasionally passing upwards beneath the peritoneum covering the posterior abdominal wall towards the region of the kidneys. The sheath of the psoas may be involved; under these circumstances the leg of the affected side is drawn up and flexed on the abdomen so as to relax the muscle. As the exudate spreads in the directions indicated, absorption of the inflammatory products may occur at the site of origin, so that the mass felt has no appreciable connection with the pelvis; this condition is

called "remote parametritis." In the course of parametritis three events may happen :

(1) The effusion may be completely absorbed without the formation of scar-tissue and without suppuration. Under these conditions the pelvic tissues and organs gradually resume their normal condition, and the mobility of the uterus is restored.

(2) Scar-tissue may form in the process of healing, and, as the newly formed tissue contracts, it draws the uterus over towards the affected side. If the effusion has spread backwards a stricture of the rectum may result.

(3) An abscess may form. A parametritic abscess in its earlier stages has a honeycombed appearance, loculi full of pus lying among trabeculæ of coagulated lymph. In 75 per cent. of the cases the abscess points over the inner half of Poupart's ligament, but the pus may track along the sheaths of the vessels through the sciatic notch, and point in the buttock or beneath Poupart's ligament, and point as a psoas abscess. Occasionally pus reaches the kidney and a perinephric abscess results. Sometimes a parametric abscess discharges itself through the bowel or bladder, or into the peritoneal cavity.

SP. 2939A.—*Parametric abscess.*

The left half of a uterus with the uterine appendages of the same side. Between the two layers of the broad ligament is a rounded swelling firmly attached to the side of the uterus. The swelling has been laid open on its posterior aspect, and pre-

sents a honeycombed appearance. In the recent state it contained a number of small abscesses.

SP. 2951E.—*The Bladder, Uterus, and Appendages from a case of Parametric Abscess.*

The uterus is enlarged but empty. The appendages of the left side are natural. To the right of the uterus, lying in the broad ligament, is an abscess communicating with the peritoneal cavity by two large apertures. These were closed during life by adhesions of the intestines and omentum. The right ovary and tube are involved in the abscess. The bladder is inflamed, and the upper part of the urethra dilated.

From a patient in whom abortion was induced twelve days previous to her death on account of irreducible incarceration of the retroflexed gravid uterus.

SP. 2951D.—*A Sagittal Section of the Pelvic Viscera from a case of Parametric Abscess of the right side.*

The uterus and its appendages are displaced to the left of the pelvis by a large abscess lying partly between the two layers of the broad ligament, but extending into the right iliac fossa. The ragged walls of the abscess cavity are seen on the posterior aspect of the specimen. The inflammatory process has extended into the cellular tissue between the bladder and uterus (anterior parametritis).

A drawing of the parts as they appeared *in situ* is preserved in Series LVII, No. 993, q.v.

PERIMETRITIS.

The term “perimetritis” means inflammation of the serous covering of the uterus. It is, however, applied to all forms of pelvic peritonitis secondary to disease of the uterus and its appendages.

ÆTIOLOGY.—In the majority of cases perimetritis is due to inflammatory conditions of the Fallopian tubes. It may be associated with a number of other conditions, such as—

- (1) Infections of the puerperal uterus (puerperal perimetritis).
- (2) Strangulated or inflamed ovarian cysts.
- (3) Infected or degenerate fibro-myomata.
- (4) Malignant disease of the uterus, Fallopian tube, or ovary.
- (5) Effusions of blood in the peritoneal cavity (pelvic hæmatocele).
- (6) Operations upon the pelvic organs.
- (7) Parametritis.

PATHOLOGICAL ANATOMY.—The inflamed peritoneum is reddened, the surface loses its lustre, and the cells of the endothelium are shed. Adhesions form between adjacent viscera and inflammatory fluid, serous or purulent, is found between the adherent structures.

CLASSIFICATION.—In all cases effusion of inflammatory fluid occurs. In some instances the amount is small, in others it is sufficient to form definite collections which constitute a striking feature of the

disease. According to the amount and nature of the fluid exuded perimetritis is classified as adhesive, serous, or purulent.

(1) ADHESIVE PERIMETRITIS.

The amount of the inflammatory exudate is small, and the adhesions between the viscera constitute the most marked feature of the disease. The adhesive form occurs in the milder degrees of inflammation, and is typically seen round a pelvic hæmatocele, shutting off the effused blood from the general peritoneal cavity ; or in cases of salpingo-oophoritis where the ovary and tubes are thickened, and form a mass united to the neighbouring viscera by peritoneal adhesions.

When the acute stage of the disease is over the peritoneum remains roughened and shaggy. In some cases the adhesions are converted into fibrous tissue which contracts, binding the viscera together, and fixing them in abnormal situations. The ovaries and tubes may thus be fixed to the floor of Douglas's pouch, and the uterus may be drawn over and fixed to one or other pelvic wall. In other cases the adhesions stretch and persist as bands reaching across the pelvic cavity, their extremities being attached to viscera, which at one stage of the disease were closely adherent.

SP. 2952B.—*Adhesive Perimetritis.*

The rectum, uterus, and uterine appendages from a case of adhesive perimetritis. The peritoneum

covering the fundus uteri and that lining Douglas's pouch is thickened and covered with shaggy flakes of organised lymph. There are numerous peritoneal adhesions between the uterus and the neighbouring organs, the largest of these crosses Douglas's pouch and unites the uterus to the anterior wall of the rectum. Others pass from the uterus to the ovaries, and from the ovaries to the peritoneum covering the pelvic walls. Both Fallopian tubes are thickened, coiled upon themselves, and adherent to surrounding structures. Their abdominal ostia are sealed and the distal extremities of the tubes dilated.

SP. 2953.—*The Uterus and its Appendages from a case of Adhesive Perimetritis.*

The fundus of the uterus is drawn over to the left by a number of adhesions which pass between it and the uterine appendages of that side. The left ovary and tube are adherent to one another, and form a mass which was fixed to the lateral pelvic wall and to the uterus by bands of fibrous tissue formed as the result of previous inflammation. The appendages of the right side show similar evidence of inflammation. The tube is thickened and adherent to the ovary; the abdominal ostium is closed.

SP. 2952.—*A Uterus with its Appendages from a case of Adhesive Perimetritis.*

The appendages of the left side are thickened, matted together, and adherent to the uterus. As the result of adhesions the body of the uterus is

drawn over to the left. The right appendages are thickened, but not adherent to the uterus. The abdominal ostium of the right tube is sealed.

SP. 2952A.—*A Uterus and its Appendages, together with the Utero-rectal Pouch of Peritoneum.*

The ovaries are prolapsed, adherent to one another, and to the posterior aspect of the uterus in front, and the rectum behind.

SP. 2944A.—*Adhesive Perimetritis with Pyosalpinx.*

A sagittal section through a uterus and bladder. The bladder is contracted. The uterus, in a position of acute ante-flexion, is fixed to the bladder by peritoneal adhesions. The cavity is dilated and its mucosa roughened. The left Fallopian tube is thickened, elongated, and tortuous. The ovary is fixed to it by adhesions, the two constituting a mass adherent to the surrounding structures.

(2) SEROUS PERIMETRITIS.

In this variety a quantity of serous fluid of inflammatory origin is poured out and constitutes a definite tumour. Such a perimetritic cystoma possesses no walls of its own, but is limited by the peritoneum covering the abdominal walls and the serous coats of adjacent viscera united to one another to form a false capsule. The tumour is commonly found in one of two situations, either behind the uterus, displacing it forwards and bulging into the

posterior vagina fornix, or immediately beneath the anterior abdominal wall above the pubes. In the majority of such cases the fluid is ultimately absorbed. The cavity which contained it contracts, but the adhesions between the peritoneal surfaces persist.

(3) PURULENT PERIMETRITIS (perimetric abscess).

In some instances, either from the severity of the original inflammation, or as the result of a secondary infection of the serous fluid already present, the cystoma is filled with pus. In such cases a membrane, the so-called "pyogenic membrane," may be found lining the walls of the cavity. Pus is seldom absorbed, but from the death of the organisms contained in it may become sterile, and remain for a long time shut in by the enclosing viscera, and produce but slight symptoms. More often the wall of the cavity gives way at some point and the pus escapes into the vagina, bladder, bowel, or peritoneal cavity.

SP. 2947A.—*Purulent Perimetritis.*

The left half of the pelvic organs showing purulent perimetritis associated with pyosalpinx and prolapse of the uterus. The pouch of Douglas was the site of a large perimetric abscess. Its peritoneal surface is roughened and covered with flakes of lymph and pus. The left Fallopian tube is adherent to the surrounding viscera and filled with pus. The specimen was taken from the body of a woman who died with cancerous deposits on the peritoneum.

SP. 2945A.—*The Bladder, Uterus, and part of the Intestines from a case of Purulent Anterior Perimetritis.*

Behind and above the bladder and in front of the uterus is an abscess cavity. Above, the abscess is limited by adherent coils of intestine; below, it has depressed the utero-vesical pouch of peritoneum, separating the uterus and vagina from the bladder. The cavity is sacculated, corrugated, and lined by a well-defined "pyogenic membrane."

VII.

ABNORMALITIES OF DEVELOPMENT OF
THE GENITAL ORGANS.

THE VULVA.

(1) ABSENCE.—The vulva may be entirely absent, the skin passing smoothly from side to side of the perineal region. The bladder, rectum, and genital ducts open into a blind cloaca. The urine cannot escape, and causes distension of the bladder. The condition is incompatible with life.

(2) ATRESIA.—The opening of the vulva is absent owing to adhesion of the labia, due to vulvitis in infancy or to a congenital defect. An opening through which urine and menstrual blood can escape is usually present at the anterior part of the vulva. The adhesion can be broken down easily in most cases.

(3) PERSISTENT CLOACA.—The rectum, vagina, and bladder open into one common orifice. The usual situation of the anus is marked by a dimple. The obstetric perineum is absent.

(4) PERSISTENT URO-GENITAL SINUS.—The anal canal opens in its normal position and the perineum is

present. The vagina and bladder open into the vestibular canal, which is longer than normal. The urethra is absent or very short.

(5) EPISPADIAS occurs (1) as a malformation affecting the urethra only; (2) in conjunction with ectopia vesicæ.

In the first case the urethra is represented by a groove passing beneath the pubic arch.

In the second case the pubic arch is deficient, and the bodies of the two pubic bones are separated by several inches. The lower part of the anterior abdominal wall, the anterior vesical wall, and the upper wall of the urethra are also absent. An area covered with mucous membrane (the posterior wall of the bladder on which are seen the ureteric orifices) occupies the normal situation of the Mons Veneris.

SP. 3667, 3668.—*Pelves from cases of extroversion of the bladder.*

See also Sp. 3670—3668.

(6) DOUBLE VULVA.—In cases of uterus didelphys the vulva may be duplicated, but notwithstanding the failure of union of the two Müllerian ducts is usually single. In cases of duplication the clitoris may be single or double.

THE HYMEN.

ABSENCE.—The hymen is absent only in cases of absence of the vulva.

ATRESIA.—Imperforate hymen, if such a condition exists, is very rare. The cases reported are usually instances of a transverse septum low down in the vagina (the imperforate lower ends of the Müllerian ducts). The septum is forced downwards by accumulation of uterine secretions and menstrual fluid, and, in consequence, the hymen is flattened out on its superficial surface and rendered indistinct.

DOUBLE HYMEN.—A partial transverse vaginal septum may simulate a double hymen, but true duplication is unknown.

ABNORMALITIES OF THE ORIFICE.—The margins of the hymeneal orifice are usually smooth, but may be indented (hymen denticulatus) or fimbriated (hymen fimbriatus). Two openings may be found (hymen biforis) or many (hymen cribriformis).

SP. 3016A.—*The Uro-genital Organs of a Female Infant aged 7 weeks.*

The large fibrous sac, divided by a mesial section, is the vagina enormously distended by puriform fluid prevented from escaping by an “imperforate hymen.” The uterus, whose cavity is also distended, and whose walls are thin, is situated at the upper part of the dilated vagina. The bladder is enlarged, and is drawn completely out of the pelvis, thereby causing elongation of the urethra. The ureters are compressed, and, together with the calyces of the kidneys, dilated above the point of obstruction.

THE VAGINA.

(1) ABSENCE.—The vagina may be absent under two conditions—(1) When the lower portion of the Müllerian ducts have not developed; (2) when the lower portion of the ducts have not become pervious, but are represented by a solid column of tissue.

SP. 3677.—*The Pelvic Viscera of a Woman showing Absence of the Uterus and Vagina.*

The ovaries are present, and occupy their usual position. The Fallopian tubes terminate in the peritoneum on either side of the rectum. They do not meet, and consequently there is no uterus or vagina. The peritoneum passes smoothly across the floor of a deep pouch between the bladder and rectum.

The external genitals were represented by a shallow depression in the position of the fossa navicularis.

SP. 3675.—*Impervious Müllerian Ducts.*

A sagittal section of a female pelvis and its contents. The vaginal canal is short, measuring one inch in length, and ends blindly above in a mass of tissue representing the upper part of the vagina and cervix uteri. The uterus is greatly hypertrophied. A director has been passed through the solid tissue which intervenes between the vagina and the uterine cavity.

This opening was made by puncture with a trocar

to allow the menstrual fluid retained in utero to escape.

(2) DOUBLE VAGINA.—It is rare to find two complete vaginae each with a cervix uteri opening into it above, and terminating in a separate vulva below. Vertical septa are more common, and divide the vagina into two lateral portions, opening below at a common vulva. Above, such a septum may reach the vaginal vault, in which case a cervix is found in each portion, or may end with a free upper margin, when the cervix may be either single or double.

SP. 3673C.—*Double Vagina.*

The uterus is single, and the Fallopian tubes spring from its cornua. The vagina is divided by an antero-posterior septum, which extends nearly to the cervix.

The broad ligaments are involved in a carcinomatous growth, probably of ovarian origin.

SP. 3673D.—*Double Vagina and Cervix Uteri.*

The fundus uteri and appendages are natural. The uterus is divided about the level of the os internum into two cervical portions. Both cervical canals communicate with the uterine cavity. Each cervix opens into a separate vagina. There is only one vulva.

See also Sp. 3673.

THE UTERUS.

Abnormalities of the uterus depend upon (1) incomplete development of one or both Müllerian ducts; (2) incomplete fusion of those portions which normally unite to form the uterus.

(1) INCOMPLETE DEVELOPMENT.

(a) ABSENT UTERUS.—In this condition the lower part or more rarely the whole of both Müllerian ducts is wanting. In the former case the Fallopian tubes are present, but the uterus and vagina absent (SP. 3677); in the latter case the tubes are absent also.

(b) UTERUS UNICORNIS.—In this condition one duct develops in a normal fashion, but the other remains rudimentary, and is attached low down to the side of its better developed fellow. The round ligament on either side is attached to its corresponding uterine horn.

SP. 3674A.—*Uterus Unicornis*.

The right cornu is rudimentary, and contains no cavity. It is attached near the middle of the right border of the well-developed left cornu. The round ligaments and Fallopian tubes are attached to their corresponding uterine cornua.

(2) INCOMPLETE FUSION.

(a) UTERUS DIDELPHYS.—In this condition the two Müllerian ducts are equally developed, but have not fused; we find therefore two uteri, each with a Fallopian tube attached to its summit, and two vaginae. The two ducts may be quite separate, or may adhere to each other as they lie side by side.

(b) UTERUS BICORNIS.—Here fusion has occurred in the lower portion of the Müllerian ducts, so that there is only one vagina and one cervix; but the portions of the duct which form the corpus uteri have failed to unite.

SP. 3673A₁.—*A Bicornute Uterus with its Appendages.*

The cervix is single, but the body of the uterus is divided into two equal lateral portions. To the summit of each portion the corresponding Fallopian tube is attached.

SP. 3673A.—A similar specimen.

(c) UTERUS SEPTUS.—In this condition the ducts have fused incompletely, and the site of their junction is marked externally by a groove, and internally by a vertical septum. The division may involve the whole length of the uterus, or may be limited to the fundal or cervical ends.

SP. 3672.—*Uterus Septus.*

A uterus and its appendages. On the exterior of the uterus at the fundus is a groove, marking a

division into two lateral halves. Internally a thick vertical partition extends from the top of the cavity to the upper part of the cervix. Each division of the cavity communicates with the corresponding Fallopian tube.

See also Sp. 3673D.

(d) UTERUS SUBSEPTUS.—This condition resembles that just described except that the external groove is absent.

Sp. 3673.—*Uterus Subseptus*.

A uterus and vagina. On its external aspect the uterus appears single. Internally it is divided by a vertical septum, which extends into the vagina, and nearly reaches the vulva.

THE FALLOPIAN TUBES.

ABSENCE AND DUPLICATION of the Fallopian tubes are extremely rare.

ACCESSORY TUBES.

These small structures resemble the infundibular portion of a Fallopian tube, and are provided with an ostium and fimbriæ. They are usually situated near the abdominal ostium. Their lumina may end blindly or may communicate with that of the main Fallopian tube.

SP. 2915B.—*A Teratomatous Cyst with part of the Fallopian Tube.*

The fimbriæ of the tube are swollen and cystic. Two accessory tubes are present, one situated on the upper surface of the main tube is attached to its wall; the other, near the hydatid of Morgagni, apparently ends blindly in the mesosalpinx.

THE OVARIES.

Absence of the ovaries or the presence of a third gland are extremely rare phenomena, but occasionally in the course of development a portion of one ovary may become cut off and detached from the remainder. Non-descent of the ovary is occasionally seen, one or both glands remaining above the brim of the pelvis.

The elongated foetal form may persist throughout adult life.

SP. 3669A.—*A Uterus with its Appendages.*

The ovaries are long and narrow, preserving the foetal form.

VIII.

HERMAPHRODITISM.

In the original sense of the word a hermaphrodite is an individual capable of performing the functions of both a male and a female in the process of reproduction. As far as we know, no such being has ever existed, and the word is now applied to a variety of abnormalities which fall into two main classes:—

(1) Where, in addition to the organs of generation of one sex, the individual possesses some of those belonging to the other—"Anatomical Hermaphroditism."

(2) Where the external appearances are such that mistakes may arise as to the sex of the individual—"Clinical Hermaphroditism."

(I) ANATOMICAL HERMAPHRODITISM.

(a) SPECIFIC OR TRUE HERMAPHRODITISM.

The generative glands of both sexes are present in one individual.

Three varieties are met with:

(1) Bilateral, where an ovary and testis are present on both sides of the body.

(2) Unilateral, where an ovary and testis are

present on one side and an ovary or testis on the other.

(3) Lateral, where an ovary is found on one side and a testis on the other.

Such cases are rare, and reputed instances can only be accepted after microscopical examination of the glands, for their nature cannot be ascertained in any other way. Both ovary and testis are never functional in the same individual.

(b) PSEUDO-HERMAPHRODITISM.

The genital glands of one sex only are present, but organs which belong to the opposite sex, and are represented normally by vestigial rudiments only, attain a considerable size.

Thus in the male, the Müllerian duct, usually represented only by the uterus masculinus and hydaticds of Morgagni, sometimes persists and develops into a uterus, to which may be attached well-formed Fallopian tubes. A feminine appearance and enlargement of the breasts (Gynæcomastia) often accompanies this deformity.

In the female a vas deferens (derived from the Wolffian duct) and a prostate gland may be found.

(II) CLINICAL HERMAPHRODITISM.

(a) IN THE MALE.

An appearance of the external genitalia, resembling that of the female, may be produced by non-descent of the testes, ectopia vesicæ, and perineo-scrotal hypospadias. These defects are often accom-

panied by smallness of the penis, large mammae, feminine facial appearance, and sometimes by the presence of a vestibular canal guarded by a hymen.

SP. 3671B.—*Pseudo-hermaphroditism*.

The bladder and internal organs of a man (father of two children). Neither testis had descended into the scrotum. The bladder is natural and the prostate present, but flattened. Behind it is a uterus, nearly as large as in the female. A bristle has been passed into the opening in the lower end of the vagina. It appears in the urethra through the sinus pocularis. Extending from either side of the uterus was a fold of peritoneum like a broad ligament. Most of the posterior fold has been removed, displaying the structures enclosed.

There are present on both sides :

- (1) A testicle, epididymis, and vas deferens.
- (2) A Fallopian tube (impervious) extending from the cornu of the uterus to the globus major, and occupying the situation of the hydatid of Morgagni, the remnant of the Müllerian duct in the normal male.
- (3) A round ligament, springing from the cornu of the uterus in front of the Fallopian tube, passing through the inguinal ring (not shown) and ending in the empty tunica vaginalis (the sac seen on either side of the specimen).

SP. 1315L.—*Hypospadias*.

Three photographs of the male external genitalia which resembled the pudenda to such an extent that

for some years the individual had been brought up as a girl.

No. 1 is a photograph of the man showing the general appearance.

No. 2 represents the genital organs, showing the rudimentary penis, the urethral opening, and the divided scrotum.

No. 3 shows the result of an operation performed to restore the meatus urinarius. (A black catheter is placed in the urethra.)

SP. 3670A.

The testes, scrotum, and perineum of a cryptorchid. The penis and scrotum are small.

SP. 3670.—*Epispadias*.

The penis of an adult showing epispadias. A median cleft on the dorsum of the penis involving the urethra extends from the glans to the pubic arch. A loose fold of integument covered the fissure in its whole extent. The penis is short; the other parts are well formed.

SP. 1315.—*Epispadias*. (Drawing.)

The external genitalia of a boy showing a condition of epispadias treated by operation. The rudimentary penis, small scrotum, and muco-cutaneous folds below the glans produce an appearance resembling that of the pudenda.

SP. 3668.—*Extroversion of the Bladder.*

The pelvic viscera of a male child showing extroversion of the bladder. An operation was unsuccessfully performed some weeks before death. Two black rods are placed in the ureters, two bristles in the vasa deferentia, and a third bristle in the sinus pocularis. The pubic bones were separated by an interval of $1\frac{1}{2}$ inches. The recti muscles diverged on either side of the extroverted bladder. The testes were normal. They have been removed.

(b) IN THE FEMALE.

An appearance resembling the male is produced by adhesion of the labia with hypertrophy of the clitoris and by bilateral labial ovarian hernia.

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